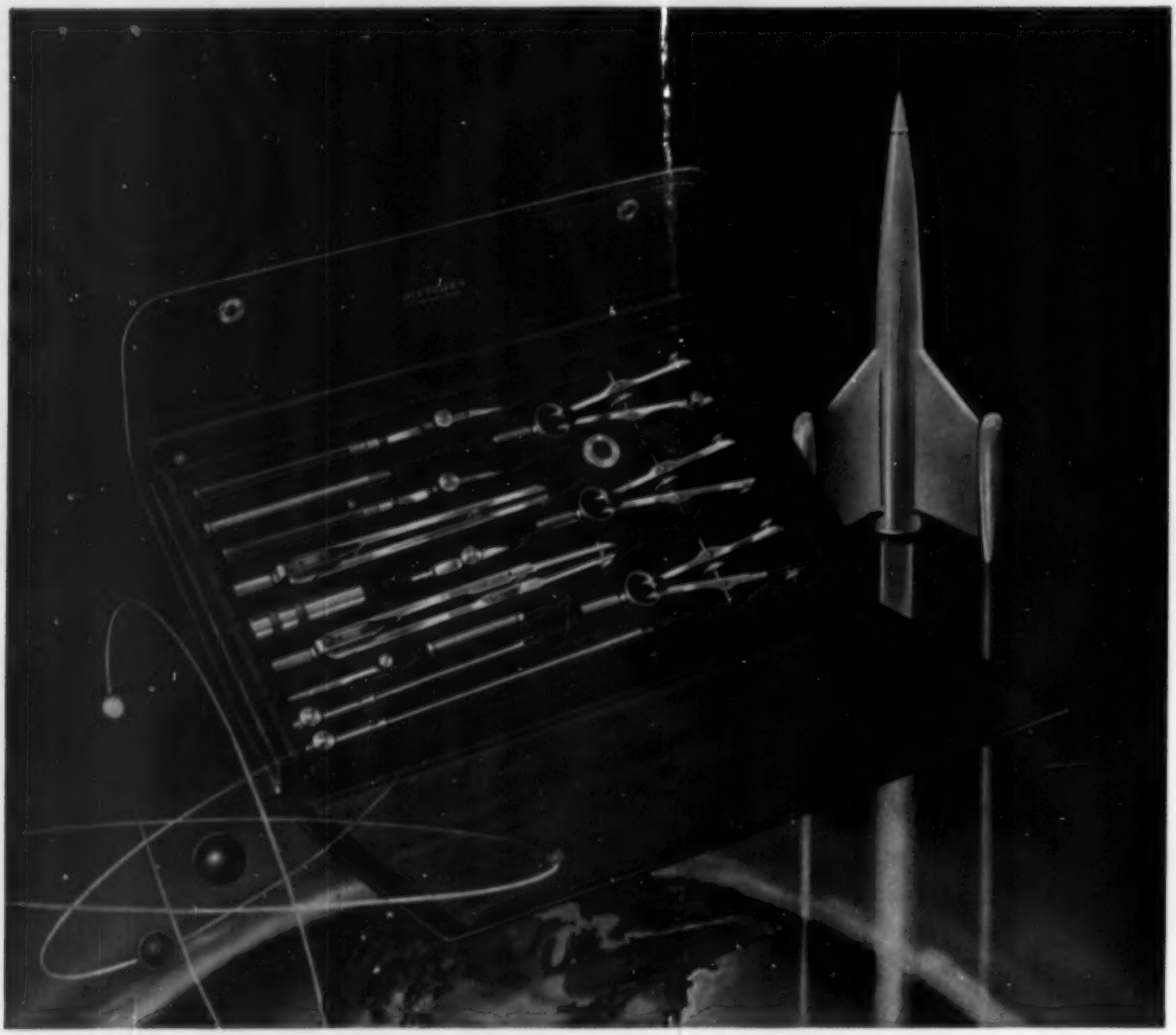
September, 1956 Vol. 45
No. 7

Industrial Arts and Vocational Education

SCHOOL OPENING NUMBER

The Shop Teachers' Professional Magazine



THE NATION'S NEED IN ENGINEERS

America knows well that her future, possibly her very survival, depends on the engineering talent she can muster in the years immediately ahead. America needs many more engineers. But of vastly greater importance than mere numbers will be the capacity of these engineers for achievement. Will they be *able* engineers? Will they be men of high standards, men of sound judgment, men inspired to great accomplishments? These are matters vital to the nation, consequences which may be determined early in the training of tomorrow's engineers.

The way men think is often shaped by influences they hardly recognize. Drawing instruments are a good example. If they are fine instruments, precision inspires precision. Pride of ownership inspires pride in accomplishment. As the twig is bent, so grows the tree. Men who cannot respect their tools cannot respect their craft. Men without high standards and discriminating judgment can never merit either responsibility or success in engineering. Technical knowledge avails little if its application cannot be trusted.

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Familiarizes the student with the back-geared, screw-cutting lathe. Covers the principal lathe parts, their purpose and operation. Time 20 min. 16 mm sound, full color. *Free loan.*

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Teaches basic between-centers operations. Also, use of calipers and micrometers, selecting cutter bits, drilling center holes. Time 20 min. 16 mm sound, full color. *Free loan.*

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The original and most popular handbook on the operation and care of metalworking lathes, shop methods and practices. Written in simple, non-technical language. 53rd edition. 128 pages—365 illustrations. 50c. Also printed in Spanish and Portuguese languages.

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The use and care of the metalworking shaper are clearly described and illustrated in this handbook. Also, set-ups and tool grinding are included. 24 pages. 25c.

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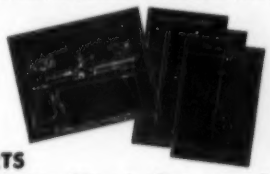
Accurate shop planning with complete sets of ¼″ = 1′ scale models of 10 different types of machines. All necessary layout material included. *Free loan.* Write for Bulletin 5516.

NEW PROJECT BOOK
Step-by-step instructions and drawings for 34 projects suitable for both beginners and advanced students. 104 pages. $2.



FOUR WALL CHARTS
Principal Parts of a Lathe, How to Become a Machinist, Decimal Equivalents, Tap Drill Sizes. 15c each.

CATALOG 5600
Every shop instructor and supervisor should have this completely new 80-page Golden Anniversary catalog of all South Bend machine tools and their attachments.

This includes Toolroom Lathes with 9″, 10″, 13″, 14½″ and 16″ swings; Engine Lathes with 9″, 10″, 13″, 14½″, 16″ and 16-24″ swings; Turret Lathes with 1″ collet capacity and 10″, 13″, and 16″ swings; Vertical Spindle Milling Machines; 7″ Bench Shapers; 14″ Drill Presses, bench and floor models; 8″ and 10″ Pedestal Grinders.

HOW TO ORDER. Sample copies of all printed teaching helps except Project Book will be sent free to shop supervisors. Request loan information on Films and Shop Model Kit.

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SOUTH BEND 1906 50th ANNIVERSARY 1956

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Rear View

NEW

CINCINNATI DIVIDING HEADS

10" 12" 14" SWING

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- Angular Vertical Swivel
- 360° Peripheral Clamping
- Direct Indexing on Spindle Nose
- Completely Enclosed Headstock

CINCINNATI

CINCINNATI

SEPTEMBER
1956

VOL. 45 NO. 7

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

Published on the 15th of the month preceding the date of issue by THE BRUCE PUBLISHING CO., 400 North Broadway Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 233 Broadway, New York 7, N. Y.

☆ ☆ ☆

This Month's Cover

The photograph on the cover of this issue of the magazine shows Alfred Heineken, instructor, giving individual instruction to William Ritzi, electrical apprentice student in the related theory, mathematics, and blueprint reading class at Middlesex County Vocational and Technical High School, New Brunswick, N. J.

Photograph submitted by Charles F. Green, evening school principal.

☆ ☆ ☆

A Change in Rates

Beginning with the September, 1956, number of the magazine, the subscription rates are as follows:

$3.75 a year in the United States, U. S. possessions, and Canada.

$4.25 in all foreign countries.

Single copies, 50 cents.

The March School Shop Annual, $1.00.

☆ ☆ ☆

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Editorial Contributions.—The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for upon publication. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed.—The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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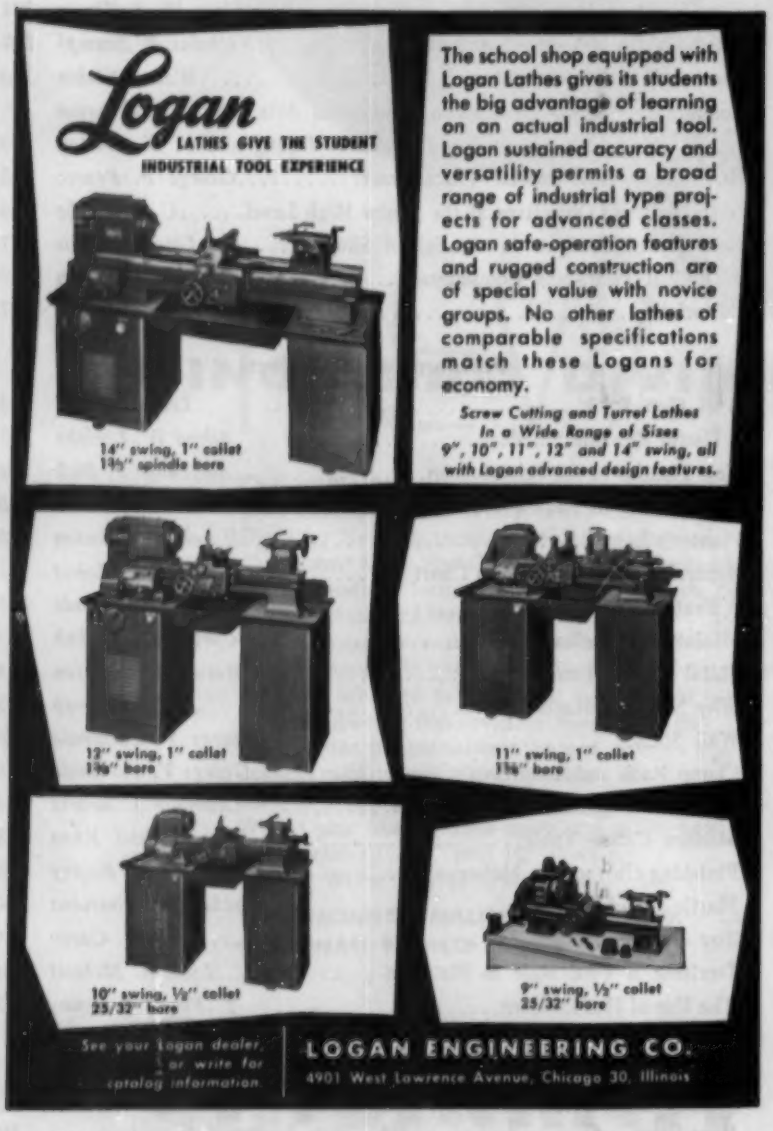
Association News

INDUSTRIAL ARTS CLINIC

Twenty-nine experienced industrial-arts teachers from five states were in attendance at an Industrial Arts Clinic at the industrial-arts division, Wisconsin State College, Platteville, Wis., from June 18 to 22, inclusive. Intensive work was done in graphic arts, art metal, plastics, and leatherwork. Sessions were held throughout the day and in the evenings. Participants expressed satisfaction with the results. Plans are being made for similar work in the summer of 1957.

Those who participated were: MILTON BLAKE, Menomonie Falls, Wis.; HARLEY BULGREN, Hopkinton, Iowa; JORDAN CARLSON, Brookfiled, Wis.; JOHN CHRISTENSEN, Sheboygan Falls, Wis.; TOM DALEY, Orangeville, Ill.; LLOYD EDGE, Clinton, Wis.; W. D. GLASGOW, Oxford Junction, Iowa; CURTIS GREENWOOD, Burlington, Wis.; KURT GRIMM, Milwaukee, Wis.; WENDELL JACKSON, Dubuque, Iowa; C. S. JOHNSON, Platteville, Wis.; JAMES KING, Dubuque, Iowa; WALTER KUBE, Lake Mills, Wis.; WILLIAM KUCHEMANN, Hillman, Mich.; FLOYD MANN, Wonewoc, Wis.; HOWARD OLSON, Platteville, Wis.; MARSHALL PAULSON, Elkhorn, Wis.; H. A. PEDERSON, Platteville, Wis.; WILLIAM RICHARDS, Madison, Wis.; CHARLES RIDEY, Grayslake, Ill.; WILLIS SCADDEN, Random Lake, Wis.; A. W. SCHMIDT, Hebron, Ill.; HAROLD SECHTIG, Milwaukee, Wis.; FRED SHORT, Mukwonago, Wis.; MANSEL SLACK, Kewaunee, Wis.; G. TYRRELL, New Ulm, Minn.; BERNARD WILDER, Platteville, Wis.; E. W. MANZER, Platteville, Wis.; GERARD VERICK, White Lake, Wis.; and W. W. RICHARDS, Kenosha, Wis.


Logan
LATHES GIVE THE STUDENT
INDUSTRIAL TOOL EXPERIENCE
14" swing, 1" collet
1⅛" spindle bore
The school shop equipped with Logan Lathes gives its students the big advantage of learning on an actual industrial tool. Logan sustained accuracy and versatility permits a broad range of industrial type projects for advanced classes. Logan safe-operation features and rugged construction are of special value with novice groups. No other lathes of comparable specifications match these Logans for economy.
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In a Wide Range of Sizes
9", 10", 11", 12" and 14" swing, all with Logan advanced design features.
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1⅛" bore
11" swing, 1" collet
1⅛" bore
10" swing, ½" collet
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25/32" bore
See your Logan dealer, or write for catalog information.
LOGAN ENGINEERING CO.
4901 West Lawrence Avenue, Chicago 30, Illinois

THE INDUSTRIAL ARTS CLINIC

The Oklahoma Industrial Arts Association has held its annual Industrial Arts Clinic at the University of Oklahoma on June 4 to 8, 1956.

The Clinic this year was conducted by Reynolds Metals Company, as one of the regular summer workshops. During the various sessions of the five-day clinic the students were introduced to the mining of aluminum, its production, the fabrication of aluminum projects, methods of joining and fastening different types of aluminum shapes, the use of hand and power tools on aluminum, project design, and the use of aluminum tubing fittings, wood and other materials.

Students attending received a one-hour credit in Industrial Education 305.

NEW OFFICERS ELECTED

The newly elected officers of the Michigan Industrial Education Society are: president, H. EDWIN ROWLEY, Berkley; and vice-president, HERBERT J. CIGARD, Lansing.

NEW OFFICERS ELECTED

The newly elected officers of the Colorado Industrial Arts Association are: president, ORLANDO M. FRIESEN, West Denver High School; vice-president, MORRIS JOHNSON, Colorado State College of Education; secretary-treasurer, HAROLD BALDWIN, Pueblo Central High School.

♦ The annual spring initiation of Alpha Phi Chapter of Epsilon Pi Tau was held on May 5, 1956, at the 49er Theatre at Long Beach State College.

The following were inducted into the fraternity: RUSSELL A. ALBRIGHT, LINLEY A. ANDERSON, DEAN A. BARNES, THOMAS C. BUCK, MARLIN E. DENBESTE, LESLIE D. HARTER, BRUCE B. MCKAY, MARCUS J. MORROW, EDWARD J. MULDER, ARNOLD R. NIEMI, EDWARD M. PARSONS, DONALD F. POUCHER, ASHBY M. POWELL, FRANK J. ROMEO, ROBERT E. ROSE, JR., MELVIN D. SOTHAN, WILLIAM R. STAMM, ARTHUR A. THRASHER, GORDON WARNER, and GARRY B. WELLS.

The initiation banquet was held in the Steak House at Knotts Berry Farm. The banquet address was delivered by Les Harter, Technical Consultant for the Woodwork Institute of California. He spoke on "Industry — What It Expects from Industrial Arts." — *C. Thomas Dean.*

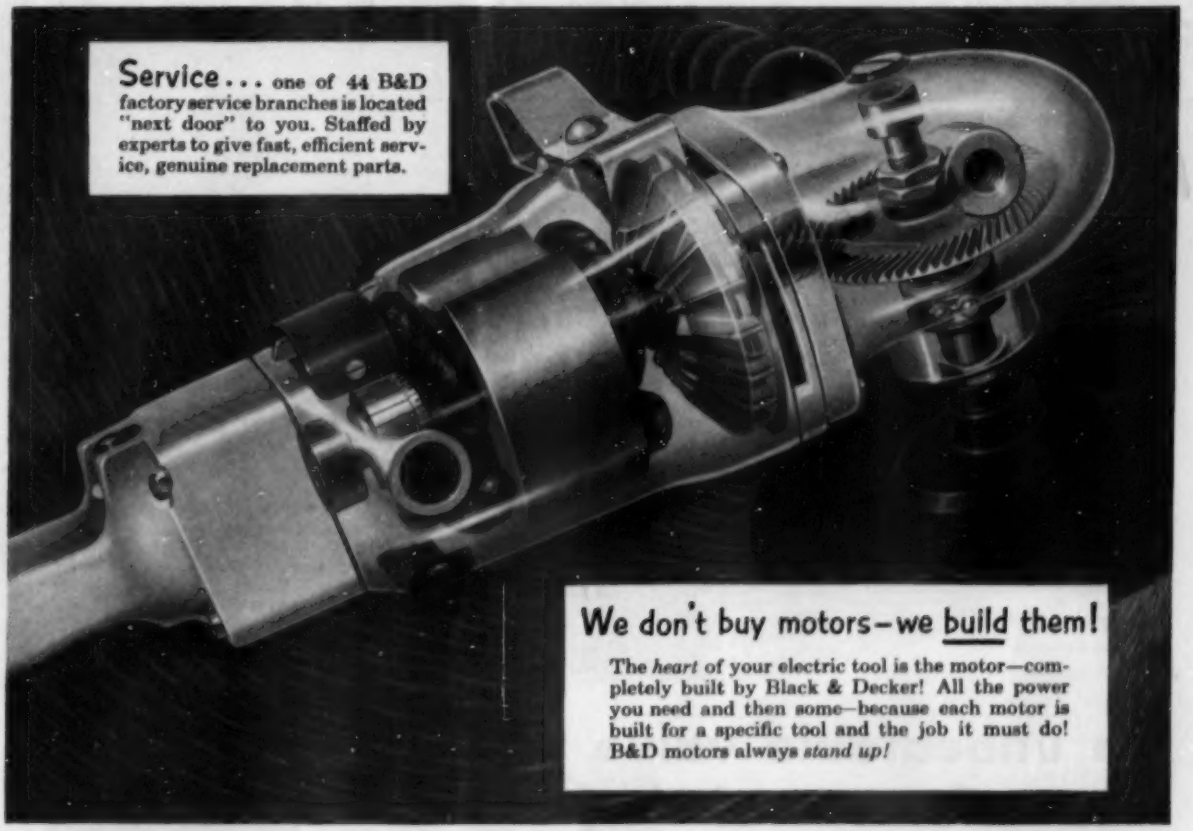
Personal News

JOHN CALLAHAN, EDUCATOR, DIES

John Callahan, emeritus superintendent of public instruction for Wisconsin, passed away Thursday, May 10, 1956, at his Madison home. Mr. Callahan served as superintendent

(Continued on page 6)

Black & Decker® Power Tools are POWER-BUILT FOR TOP PERFORMANCE!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SCREWDRIVERS-21 models

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PERSONAL NEWS

(Continued from page 4A)

of public instruction from 1921–49, a tenure which was longer than that of any other similar administrator in the nation.

An educator for 67 years and a pioneer in legislation on behalf of rural schools, Mr. Callahan was generally recognized upon his retirement in 1949 as the dean of state superintendents of the nation.

Born in Westchester County, New York, John Callahan at the age of three was brought to Wisconsin when his family moved to the Midwest. He began his professional career in the rural schools of Pierce County. He achieved his unlimited teaching certificate in 1894.

Mr. Callahan later became supervising principal of schools at Glenwood City. He also served as superintendent at New Richmond and Menasha. Before being elected to the state superintendency, he was director of vocational education in Wisconsin.

During his long career in education, John Callahan introduced many progressive measures into Wisconsin. He is perhaps best remembered for his efforts to consolidate the overabundance of school districts then existing in the state.

Mr. Callahan also sponsored the Equalization Bill of 1929, often called the "Callahan Bill," which made it possible for poor school districts to receive more aid than richer districts. Ten years later he brought about enactment of a law empowering him to consolidate school districts having less than $100,000 in property valuations with larger districts.

He was awarded an honorary doctor of laws degree by Carroll College in 1934 and by the University of Wisconsin in 1950.

An activity in which Mr. Callahan took great interest was the Wisconsin Anti-Tuberculosis Association. He had served as president of that organization and at the time of his death was a member of its Senior Council.

He was also a member and officer in numerous educational groups. Those affiliations included: life membership of the National Education and American Vocational Associations; charter member and past president of Northwestern Wisconsin Education Association; president of the Northwest Teachers Association, State Teachers Association and the National Council of State Superintendents and Commissioners of Education.

His other affiliations included: ex officio member and frequently chairman of the University of Wisconsin board of regents, State Board of Vocational and Adult Education, board of regents of normal schools, Free Library Commission, State Annuity and Investment Board, board of trustees of Stout Institute, and advisory counsel to the Psychiatric Institute. He also was active on scores of committees.

He was a member of the City Club, Milwaukee, the Rotary Club at Madison, the Elks at Menasha, and the Wisconsin Association for the Disabled.

Mr. Callahan is survived by three daughters, a granddaughter, and two sisters. His wife, the former Mary Powers, died in 1939. Mr. Callahan was 90 years old.

EMANUEL E. ERICSON RETIRES

Emanuel E. Ericson, professor of industrial arts and senior faculty member in the department at the University of California, Santa Barbara College, Santa Barbara, Calif., was honored at a testimonial banquet on May 26, 1956, on the occasion of his retirement after 31 years of continuous service. He received the title of professor, emeritus, at local commencement exercises on June 8.

Emanuel E. Ericson

Mr. Ericson was born in Sweden, in 1888. He came to America at the age of 18 as an emigrant boy who could not speak English. Establishing himself in Willmar, Minn., he began his American education by learning English, studying in his attic room at night while employed as a farm hand during the day.

He then turned to woodworking, meanwhile continuing his education at the Willmar Seminary. He later obtained a position teaching manual training at the Willmar High School which began his long career in the

(Continued on page 20A)

An unbeatable value for school shop use

This fine mitre box is designed along the same lines as the world famous Millers Falls Langdon Acme, but smaller in size, rugged, compact — and economical.

One-piece cast iron bed and back: all other parts are steel and all exposed parts are nickel-plated. The extendable swinging lever travels freely from 45° to 90°, right or left, and locks automatically at frequently used angles.

As on all Millers Falls Mitre Boxes, the saw blade is cut back at the rear so that when saw is in forward position no teeth are exposed to cause cuts and scratches while adjusting . . . a safety feature rarely found in even the most expensive mitre boxes.

Ask your supplier about this fine quality, truly economical mitre box — or write direct for detailed information.

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Dept. IA-21, Greenfield, Mass.

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SINCE 1868
The Mark of Superiority

TRAIN HIM TODAY WITH THE TOOLS HE'LL USE TOMORROW

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Put a professional SKIL tool in a young man's hands and immediately you increase his enthusiasm. Even a rank amateur recognizes a SKIL tool for an outstanding craftsman's product. He knows that he's being taught the most modern methods. He's truly being equipped for his future job.

The young man pictured at the left is using a SKIL Sander. He's quick to discover that this powerful tool is built to perform and built to take it. You'll see a quick improvement in his work. And, tool maintenance will be a lot lower, too.

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These sanders produce the finest ripple-free finishes you could ask. Ten times faster than by hand, long-lasting, powerful and easy-to-maintain. Perfect for instruction, for school maintenance, desk sanding and refinishing blackboards.

Model 448 . . . Belt Width 3"

Model 449 (with vacuum dust collector) . . . Belt Width 3"

Other SKIL Belt Sanders up to 4½" width.

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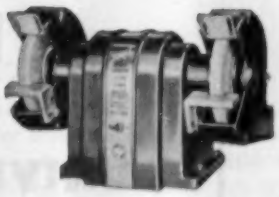
SKIL Radial Saws *are safest!* Controls are in *front*. Retractable arm clears work area. Sturdy blade guard adjusts easily. Controls recessed to prevent accidental starting. 2, 3, and 5 h.p., with 14" and 16" blades. Valuable in building trade classes; a "must" for the maintenance shop.



New SKIL 6" Bench Grinder—*Model 246.* Indispensable for training and maintenance of cutting tools. Lowest priced grinder with fully enclosed wheels, exhaust chutes, adjustable tool rests—all important safety features. Other larger models available.

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Capacities up to 1" in steel, 2" in hardwood. Motors are reserve-powered, ideally balanced for easier use by the student or maintenance man. Optional speeds. Complete line of accessories, including drill stand to make low-cost, accurate drill press.

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A MESSAGE TO TEACHERS OF AUTO MECHANICS

YOU CAN LEAD THE WAY

The importance of the mechanical arts teacher in the critical auto mechanic shortage cannot be stressed too much.

First, you provide your students with the basic knowledge and technical skills so urgently needed to service today's complicated vehicles. Equally important is the conviction you can implant in the minds of these students that the field of auto mechanics offers a worthwhile career — an occupation that commands respect and promises a remunerative future.

Here is a trade that offers wide open possibilities to the young man who wants a steady, well-paying job. Opportunities are open in establishments like new car and truck dealerships, independent garages, bus transportation companies, and trucking firms. Here an ambitious young mechanic can become a specialist in auto electrics, carburetor work, tune up, automatic transmission work, body repair. He can advance to such jobs as chief mechanic, shop foreman, service manager, etc.

Today, each high-aptitude auto mechanic student who enters another field not only represents an educational waste, but a loss of badly needed man power. It is your encouragement and enthusiasm that can help channel these skilled young hands into today's undermanned shops, garages and dealerships.

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8074-I 28th Avenue
Kenosha, Wisconsin

OLIVER Jointers are the heavy type...assuring smooth accurate jointing and fitting

The Oliver 6-in. Jointer makes perfect glue joints. Has 39-in. polished tables. Three-knife cutterhead runs in self-aligning ball bearings. Fence adjustable to 45° across table. Table lowers up to ½" for rabbeting. Write for Bulletin No. 133.

Oliver 8-in. Jointer is ideal for all classes of small and medium size work. Sturdy one-piece frame carries tables, cutterhead, fan-cooled motor, fence and guard. Its 60-in. polished tables lower up to ½" for rabbeting. Fence, adjustable across table, tilts up to 45°. Three-knife ball bearing cutterhead. Write for Bulletin No. 144.

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4 ft. Universal,	$220.00
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4 ft. Plain,	134.50

All prices F.O.B. Old Saybrook, Conn.

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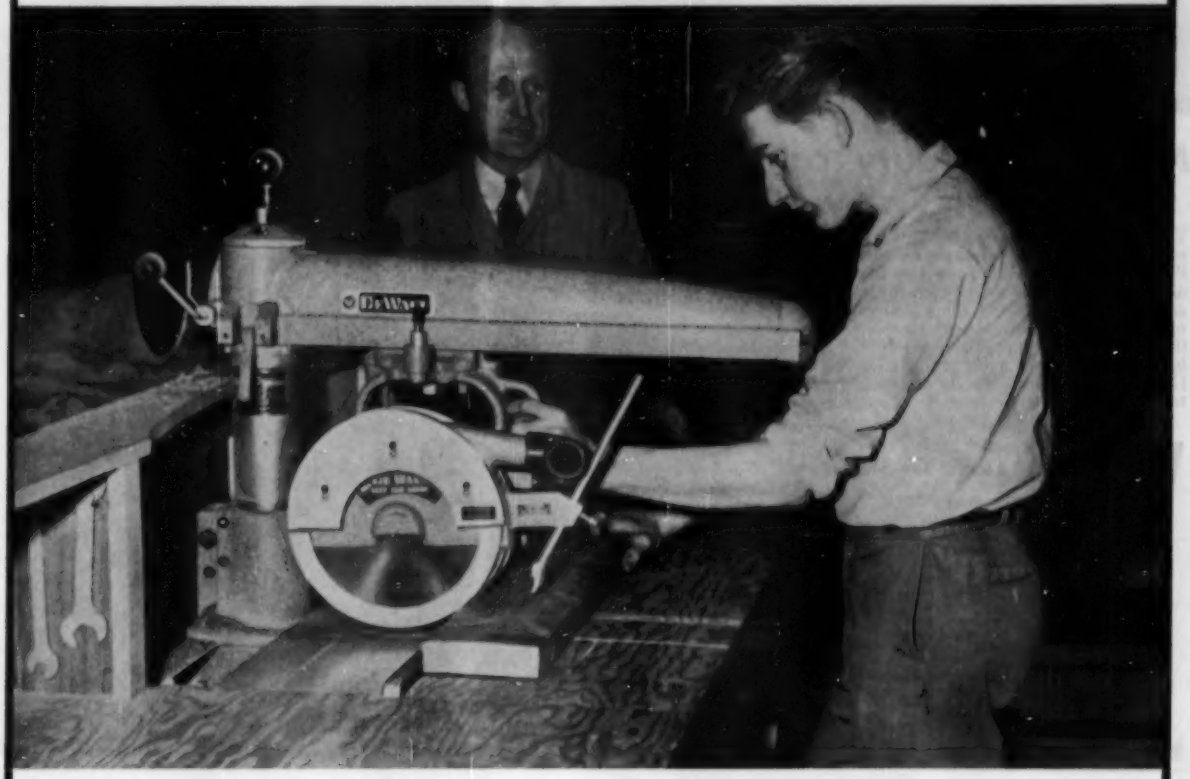
Old Saybrook, Conn.

Future job safety is your responsibility...



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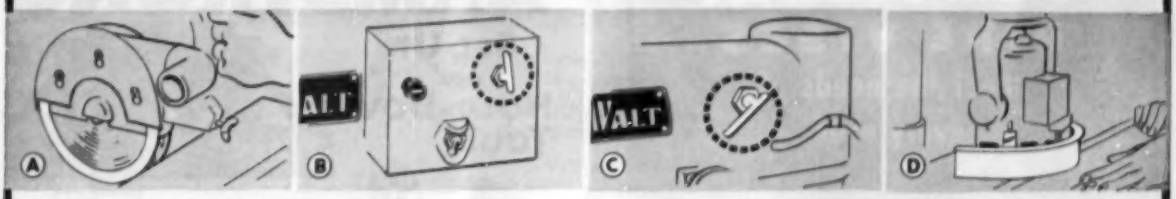

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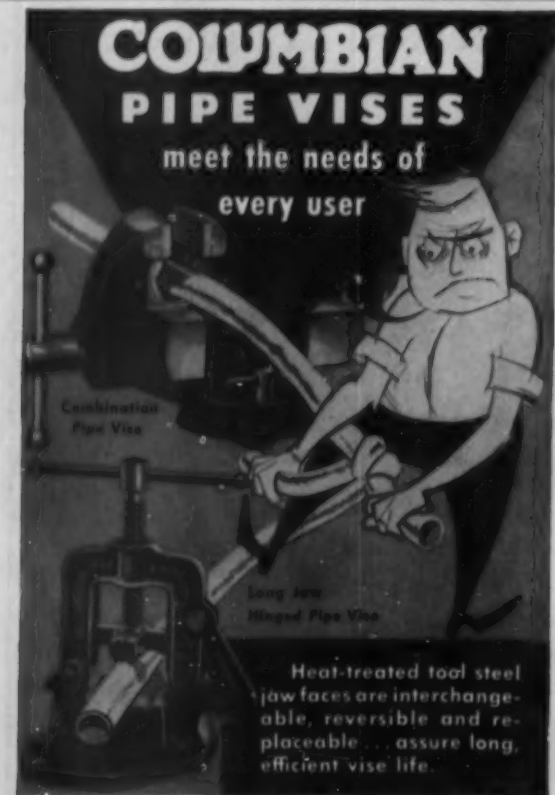

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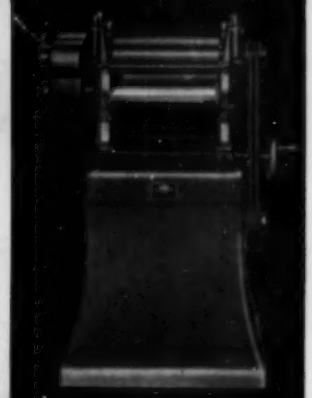

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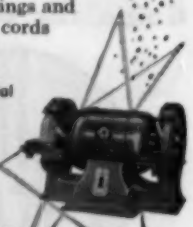

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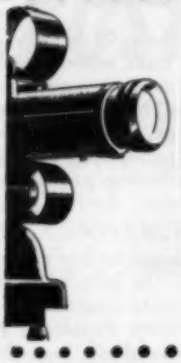

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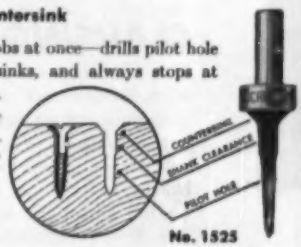

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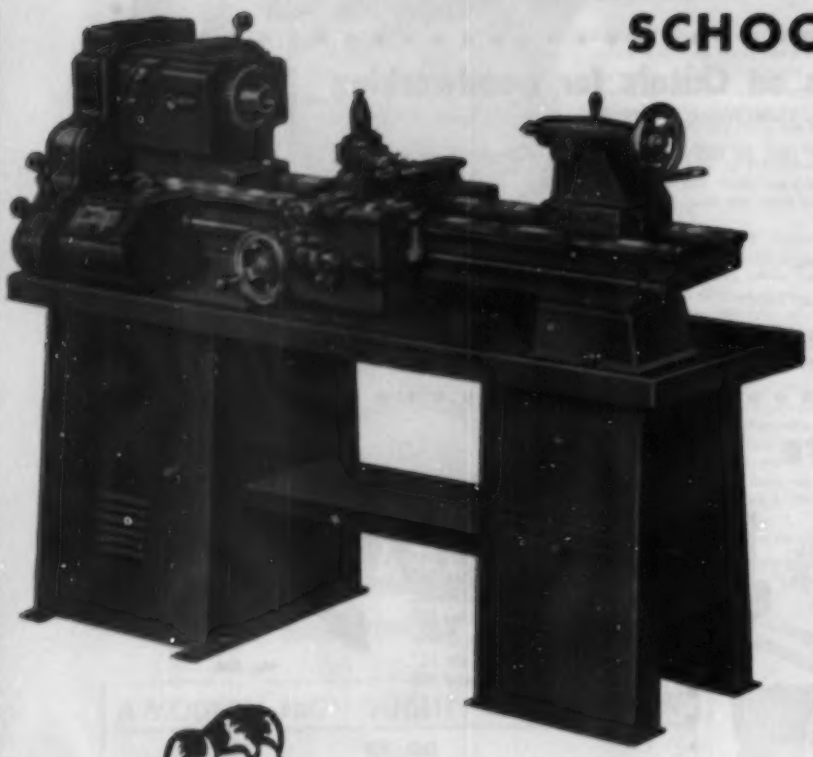

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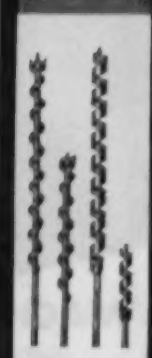

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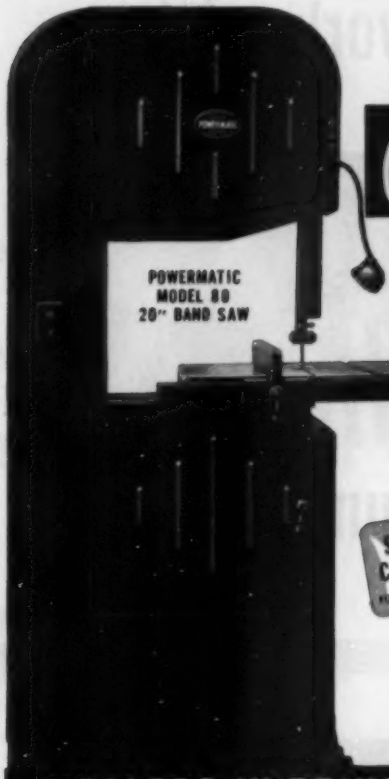

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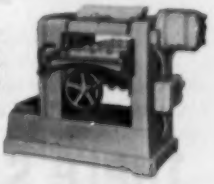

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SHAPER—1" diameter spindle, with 4½" vertical adjustment, 36" x 26" table, spindle speed—6,500 RPM, floor space—34" x 37".

BAND SAWS—machine 20" diameter wheel illustrated. Floor space 24" x 36", horizontal capacity 20", vertical capacity under guide 11". Also 27", 32", and 36" machines available.

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Industrial Arts and Vocational Education
The Shop Teachers' Professional Magazine
SEPTEMBER 1956

Projects That Teach the Principles of Lighting —

More Light on Industrial Arts

ELROY W. BOLLINGER
University of the State of New York
Department of Industrial Arts Teacher Training
New York City, N. Y.

Lighting is everyone's business but it is of particular concern to the teacher of industrial arts. From every angle, for seeing and aesthetic treatment, lighting falls within the interest and concern of those involved in consumer education, home mechanic activities, project construction, and development of young people who can understand and live effectively in technical and scientific surroundings.

Student Projects Unlimited

Projects which provide for the application of good lighting principles extend and improve the range of shop experiences and provide additional incentives for study, investigation, experimentation, and design. Lamps, lighting fixtures, illuminated signs and concealed lighting in coves and valances are excellent projects with wide appeal, practical for school shop construction, and provide unlimited opportunity for expression through design and construction.

Lighting Projects Provide the Teacher's Opportunity

Since projects are a means to an end for the teacher, the alert instructor will recognize the opportunity that these projects present for the teaching of the basic principles of lighting that everyone should know. Such principles reveal the value of sufficient illumination for good seeing, the effect of light diffusion and the evils of demon *glare*. Teaching about light, and light control, further extends the opportunity to vividly portray the applications of science in our everyday world.

Fig. 1. A table lamp of modern design made in a junior high school woodworking shop. The proportions of this lamp provide a generous distribution of well-diffused light for reading

Investigation and Experimentation Involving Lighting

Good industrial-arts experiences need not always involve the construction of a project. Some of the most valuable educational undertakings are built around investigation and experimentation. Lighting lends itself well to the *problem approach* in the school shop. Some suggested studies are:

A study of lighting levels in use in school, home, and community.

A study of lighting levels needed for reading.

A study of the effect of light on the color of materials and objects.

A study of commercially available lighting units to determine standard practices with reference to dimensions, sizes, construction, etc.

A study of light reflection values for various color values.

A consumer study of light bulb ratings and life.

Some of these studies might well develop some new and effective demonstrations of light phenomena for use in subsequent instruction.

Methods of Teaching About Light and Its Use

The subject of *light and good lighting* need not be superimposed on an already crowded industrial-arts program. Such

instruction becomes more effective when integrated into the projects and problems within the interests and needs of the pupils. Whenever projects or problems are introduced into the shop program that have some bearing on light and lighting, the stage has been set for learning about light. Many projects commonly used in school shops such as table lamps, floor lamps, lighting fixtures, lighting problems of the school stage, shop and the home provide, and require, that some instruction about the proper use of light be given.

When a need for instruction about light and lighting develops, then illustrated lectures, demonstrations, and experiments are in order. The subject of light and lighting itself can be so spectacular and so interesting in its presentation, that it is its own best salesman. As one learns more about the importance of good lighting and better seeing, the need for such knowledge becomes increasingly apparent.

Since the subject of lighting involves considerable scientific and technical information, investigation and reference reading by the pupil is encouraged. Both are effective methods of developing resourcefulness and ingenuity, particularly with the more gifted pupils. The need of industrial-arts teachers to recognize the increasing importance of technical knowledge should be apparent to anyone who looks about this increasingly technical world of ours. As far as possible the shop teacher should secure materials for the shop reference library and encourage the pupils to make use of it whenever a problem dealing with light occurs. Individual and committee studies, investigations and experiments with home, school, and community lighting can be successfully carried out where such material is readily available.

Fig. 2. Students at Bethlehem High School, Bethlehem, Pa., learn that the wheel seems to go slower in the presence of a higher level of illumination

Help for the Industrial-Arts Teacher

Few teachers have ever had a course in *lighting*, but that should not be discouraging, for most of the world's knowledge was never obtained that way. If you are desirous of arousing the

Fig. 3 (left). Whenever projects or problems are introduced into the shop program that have some bearing on light and lighting, the stage has been set for learning about light. Fig. 4 (right). The Better Light Better Sight Bureau has recently announced a group of aids to industrial-arts teachers interested in the teaching of light and lighting. Included in the program are a 100-page lighting handbook, 12 project leaflets and a reference folder summarizing the lighting principles involved in the projects

pupils' interest, enriching learning experiences for your students and are concerned with better illumination, there is help available.

Four nonprofit organizations operate to spread information and knowledge about the better use of light.

Better Light Better Sight Bureau, 420 Lexington Ave., New York 17, N. Y.

The National Society for the Prevention of Blindness, 1790 Broadway, New York 19, N. Y.

Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

The National Lighting Bureau, 155 East 44th Street, New York 17, N. Y.

The Better Light Better Sight Bureau has recently announced a group of aids to industrial-arts teachers interested in the teaching of light and lighting. This follows similar programs prepared for science and homemaking teachers, and includes a lighting handbook especially prepared for industrial-arts teachers, with project sheets and a reference folder for student use. A selected bibliography of instructional materials available from commercial interests such as filmstrips, moving pictures, and instructional devices, many without cost for school use, is included. Every industrial-arts teacher should be on the mailing list of the Better Light Better Sight Bureau's periodical "Better Light Better Sight News" available at the cost of $1 per year.

Fig. 5. A lightmeter, useful in many investigations and demonstrations about the "facts of light," can often be loaned from the local electric service company

Your local power and light company is usually willing and even anxious to assist anyone concerned with lighting for better seeing. They will assist you in obtaining instructional material and often make equipment such as a lightmeter available for use in your instruction. Yes! information, materials and often instructional devices are available for the asking. The opportunity and the responsibility for teaching about *light and sight* is yours.

An Industrial-Arts Teacher's Opportunity —

Safety in Do-It-Yourself Activities

NICHOLAS P. STUMPF
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Maine Township High School
Park Ridge, DesPlaines, Ill.

In your school and mine there is a Johnny. And he is a very fine Johnny too! His dad is a lawyer, and he is going to be a lawyer too. None-theless, under the Christmas tree last year, dad and Johnny found a bright, shiny new circular saw. There were a million of them under the Christmas trees last year.[1]

Since the above Johnny is going to be a lawyer, it is not likely that he has ever had time to enroll in a shop class. It is unlikely that either he or his father has ever had training in the safe use of power tools. The growth of the Do-It-Yourself activities has filled the schools with many Johnnies and Jills who are operating power equipment in home workshops with no training in safe practices. How many there are can only be determined by studies in the particular school situation. Where the single dwelling unit is the common form of housing, the percentage of home workshops will be large. Where apartment living is the rule, there will be less of the homecraft hobby.

On the average in your home town, there will be a home workshop in one of four houses right down the street.[1]

The home workshop was not too significant until about 1948. Since then the growth has been nothing short of amazing. The activity involves all kinds of people from all walks of life. It is not always force of economic necessity that brings them into the creative activity of Do-It-Yourself. Many could well afford to hire the work done, but they prefer to experience the satisfactions which come from accomplishment. There is leisure time in the world today and these activities fill the void with soul-satisfying work. There is a creative urge in many, and the craft activity gives expression to this urge. Do-It-Yourself with all of its glorious experiences is here to stay. A recent study, by the author, of the offerings of adult evening school programs along the Chicago North Shore, showed well over 50 per cent were in the fields of manipulative or creative activities. They are coming to evening school to find out

[1]For footnote credits see list at end of this article.

The most universal rule in hand-fed machines is to feed against the cutting edge. Mr. Stumpf uses blackboard drawings to emphasize this point.

about these fine hobbies. Industrial-arts teachers have long been stressing these activities in the worthy use of leisure time. Their influence is probably significant in the growth of this movement.

Growth of the Home Workshop Movement

The growth of the home workshop has been so rapid and so great that it is difficult to comprehend what has actually taken place. It is estimated that 6 billion dollars of business a year is attributable to the Do-It-Yourself activities.[2] This means that every time we spent a dollar and a half on public education last year, someone spent a dollar on a do-it-yourself project. It is big business! These fine creative craftsmen cut up 500 million square feet of plywood a year and they use an estimated 25 million power tools doing the job. They used 75 per cent of all the paint sold for nonindustrial use. They pasted up 150 million rolls of wallpaper, better than half of the industry production. The home craftsmen in 1954 laid 50 per cent of all the asphalt tile produced, a total of 500 million square feet.

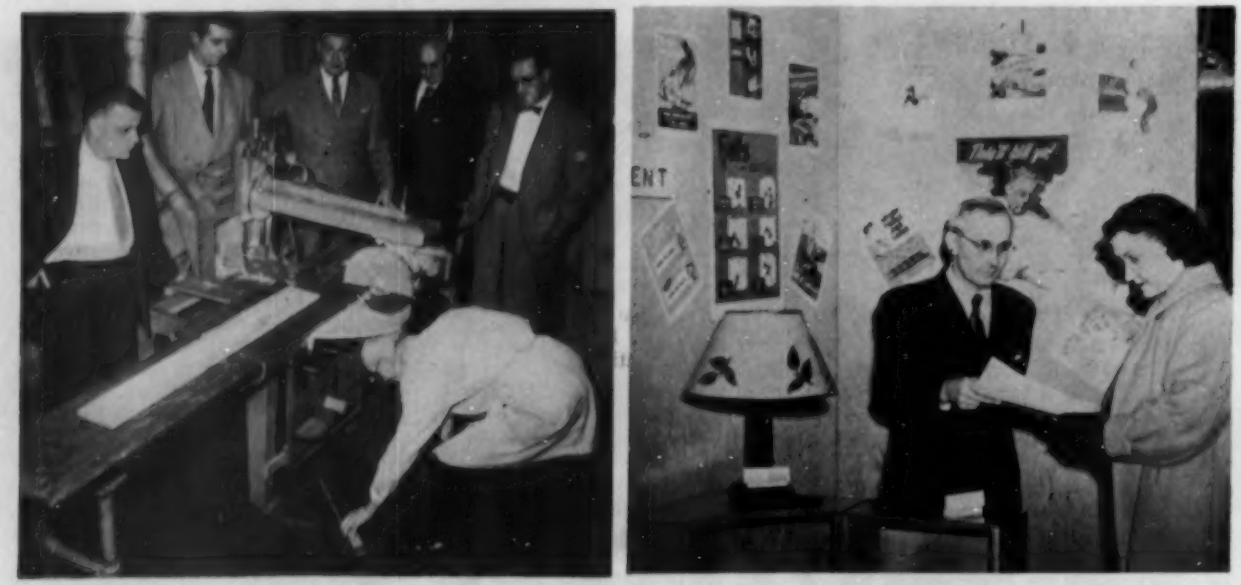
In 1953 there were 32 million sewing machines stitching up 400 million dollars worth of piece goods cut to 85 million patterns.[2]

There are estimated to be about 12 million home workshops in the United States. This means that there is a shop for every thirteen people as the census goes. The sale of power tools increases at the rate of 15 per cent per year. At this rate there are about 1 million new shops set up each year.[1]

Accidents to Home Workshop Craftsmen

People enter the ranks of the home workshoppers from every type of occupation and with varying degrees of experience. The literature has grown to meet the needs and there is no project too ambitious for the novice to tackle and accomplish. In one phase, however, there is a decided lack of growth. This lies in the area of safety training in the use of the tools being employed by the amateur workmen.

Some 650 thousand people suffered



This type of accident has happened. Protect yourself by this extension table on the radial saws, and don't wear long sleeves when you operate this or any other power saw or machine. At the right Mr. Stumpf is shown handing a visitor a safety booklet at the safety booth — a part of the annual wood-shop exhibit

Safety booth at left, and at right, boys carrying safety booklets to mail truck

lost time accidents in the do-it-yourself activities in 1954. There are 525,600 minutes in a year so it means that better than once a minute as the clock ticks, some fine craftsman suffers a disabling injury in his workshop.[1] Every two minutes someone is injured in a fall involving the use of a ladder in a do-it-yourself project. Either he used a ladder improperly or fell from a makeshift substitute for a ladder. Every five minutes some amateur craftsman is injured repairing a broken window pane. The furniture makers are also hurt at the rate of one in every five minutes. As ten minutes tick by there is a painful accident handling storm windows. Here is a listing of the areas where most of the accidents take place.

115,000 injuries a year doing their own carpentry repairs.
57,000 cleaning, oiling, or repairing gutters and spouts.
95,000 repairing broken window panes.
76,000 painting exterior of house.
31,000 painting inside of house.
47,000 handling storm windows.
11,000 painting or repairing chimneys.
16,400 putting up television aerials.
33,000 pruning trees.
32,000 repairing the roof.
98,729 making their own furniture.[1]

In order to gain insight as to how the problem of safety training might relate itself to the student body and hence to the shop instructor, the author made several studies at Maine Township High School. Students enrolled in shop classes were not allowed to participate in the survey. The study showed 28 per cent of the students not taking shop were operating power equipment in home shops with no training in the safe use of the tools.

Surveys to Determine Need of This Type of Safety Instruction

A later survey among the adult home craftsmen of the community gave very clearly similar results. Of 411 reporting, 100 had no training in the use of the power tools which they were using. Roughly 25 per cent as compared to 28 per cent of students. In the adult study there were 20 lost time accidents reported. The most significant fact indicated 66 per cent of these accidents were in the 25 per cent who had no training. This study would seem to indicate that a very effective means of accident prevention is training in the safe use of tools and equipment. These studies further seem to bear out the fact that there is a sizable group of students who are using power equipment with no training. It is also indicated that there is a sizable group of adult craftsmen in the community which has had no training in safe practices in their hobby activities.

It is one thing to recognize a problem but quite another to do something about it. Certainly the recognition of the void in safety education points up a golden opportunity for service to a fine group of creative people of the community. Since many of the enthusiastic workers are high school students it would seem that the school would have some responsibility in a program so educational in nature. Further observation and reflection brings the conclusion that — there is no group of people better prepared to give this training than the industrial-arts teachers of this land. There is no place better equipped for the work than the school shops where they work. Here is an opportunity for soul satisfying service seldom offered to any group of educators. Here is a challenge to the shop teachers of this country to give of their knowledge in the interest of accident prevention among the home craftsmen who need the service badly. Both grownups and youngsters need the rich experience and training which these teachers possess.

Here is what the author has done in pioneering this phase of safety education at Maine Township High School, Park Ridge, DesPlaines, Ill. The course was titled, *Do It Yourself But Do It Safely* and was a short, one evening session after school. It was offered only to students not enrolled in shop classes. The lesson consists of a lecture and demonstration calculated to produce serious and careful attitudes toward machine operation. The importance of observation for possibilities of injury is also stressed.

The adult course started as a one evening lesson also but has now become two evenings as materials have developed and methods have improved. The first session is devoted to the safe operation of power tools and the second session takes into consideration, safety in home maintenance projects. This latter lesson is aimed at the areas of greatest hazard as listed in a tabulation earlier in this article.

The homecraftsmen are a widely scattered group of people and it will tax the ingenuity of the teacher who tries to get groups together for safety meetings. The methods of arranging meetings which have been tried at Maine may not be satisfactory in other places. Each teacher will have to work out his own best ways. The things tried at Maine are given as suggestions in the hope that they will help other men who wish to enter this field of service to their fellow men.

The newspaper of the town can be counted on to give fine coverage to the program. In getting the first meeting at Maine a handbill was prepared and handed to each patron of the adult evening school. This method resulted in a very well attended meeting. During the first meeting I was asked if I would serve a neighborhood club in like manner and the second group came in that way. Other clubs were contacted and church groups also came in. It has been quite gratifying to see the number of father and son teams which attend these lessons. Teen-agers who come to evening sessions must be ac-

companied by an adult. As this team idea has been well received we are now in the process of contacting Boy Scout And Explorer leaders to get some father and son classes together. Thus far the hand bill and club approach have given the best attendance.

Move into this void in safety education in your town. Establish a *Do It Yourself But Do It Safely* program at your school. Reap the satisfactions which only selfless service can give. When a man walks up and says, "I'm sure glad I came tonight, because I see that I've been doing a lot of things wrong." It does something to you and it does something for you.

Footnotes

[1]Press releases, American Mutual Liability Insurance Co., Boston, Mass., 1954.
[2]U. S. Commerce Department, Washington, D. C., DSB ₹ 84.
[3]*Time* magazine, August 2, 1954, Chicago, Ill.

Important Considerations for Those Who Teach —

Handwork in the Elementary School

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Two philosophies which have been developed in regard to the conduct of handwork in the elementary school are: (1) Handwork is a subject in itself and should be presented so as to achieve its own objectives; and (2) Handwork in the elementary school is a device or method for teaching more effectively the regular school subjects. In America, Dr. Ira S. Griffith was a strong advocate for the first mentioned point-of-view since he argued that handwork was important enough to have a place among the regular school subjects and should not be absorbed by them. A look into the history of handwork in the education of children in Europe supports this point-of-view; however, public education in America today is not expected to simulate elementary education in Europe two hundred years ago. In any event, there seems to be some support for making handwork in the elementary school an additional subject in the elementary school curriculum.

More and more is handwork being recognized as a teaching device in the elementary school. The elementary school teacher has as her chief responsibility the development of the pupils in the use of the tool subjects (reading, spelling, arithmetic, etc.) common to all in a democratic society. Any skill developed by the children in manipulating tools and materials is merely a by-product of her chief efforts. If this is true, she will not offer handwork as a subject by itself but instead will use it as an aid in developing the large centers of work she has chosen as teaching units. In order that these teaching units as *Mexico, Colonial Life,* and *Eskimos of Alaska* may be dramatized and thus become the life of the child, material objects must be constructed and developed either in miniature or in real form. There is no need for each child to construct similar or identical projects. Some may construct wagons, sleds, animals, fences and the like; others may prepare articles of food, clothing, or do art work.

Ideas to be used by the children in this activity work will be obtained primarily from their reading and reference work dealing with the units under study. Here is where correlations and applications in reading, spelling, writing, geography, arithmetic, and other activities can be made. Diligent efforts in mastering the tool subjects by the children will be rewarded from time to time by permitting them to engage in activity work co-operative in nature and leading to a common goal. The modern philosophy of handwork in the elementary school suggests this course of action.

If this point of view is accepted, it appears that the classroom teacher will be the most logical one to conduct this activity period. She will be better able to correlate the work, both in respect to time and content. Too, she will not place an undesirable emphasis on the manipulative phase of the work which might occur if a special teacher is used.

Tools and Material

If we accept the philosophy that handwork can be a teaching device for the regular tool subjects, then the tools and materials that are selected for use must be suitable for the age or maturity level of the boys and girls. We must always keep in mind that the tools chosen for use must be the type and size suitable for the physical strength possessed by these children. Great care is exercised in the selection of suitable text and reference materials for children. This is as it should be. However, when the problem of tools for children is considered, it seems that we lose our carefulness. Too often, tools designed for adult use are assembled by purchasing them from the local hardware store, or from the dime store, or by accepting gifts of tools from parents, friends, or from the high school department of industrial arts. With this array of tools, how can the elementary teacher hope for much success with tool work?

Hardware stores are not generally known to carry a size of tool suitable for children, and *dime stores* are not generally known to stock tools of an adequate quality even though the size they sell may be appropriate. Has anyone ever known of parents or an industrial-arts teacher parting with good usable tools or workbenches? Through these avenues, and *hand-me-down* techniques, we get adult-sized and poor-quality tools, which are dull and rusty. Most of these tools are impossible to use even by a craftsman. As a result, children must of necessity have experiences of failure, of frustration, or certainly of very limited success. Little is the elementary teacher aware that more harm than good is being done under such circumstances. If this must be her lot it would be better if handwork activities involving tools were not conducted at all.

Successful tool work is dependent to a large degree upon rhythm, that is a pleasant muscular movement based upon an easy response or reaction of the child's muscle against the resistance of the tool. In other words, there are two forces opposing each other with the hope that the individual's muscles will be the greater. This then makes the child the master of the tool which is as it should be. If this reaction is one of exertion or futility, then no longer is it pleasant and considered satisfying. The result is an avoidance of any more of that type of experience.

Therefore, it is most important that

tools of the right size and type be chosen for children. Such a list of tools will exclude ripsaws, jack planes, smooth planes, adult-size crosscut saws, sixteen-ounce nail hammers, wood chisels, and marking gauges. Tools with a high accident factor as chisels, and sharp-pointed tools also may well be omitted from the list of tools for children. Chisels are essentially tools designed for precise work. It is a mistake to expect such a type of work from children. For shaping and forming, a coping saw and wood file will serve them adequately. Wood chisels because of their necessary sharp cutting edge are dangerous in the hands of small children. In school shops chisels are responsible for more accidents than any other woodcutting hand tool. Also sharp-pointed tools as awls and scribes may well be omitted from the list. Moreover tools calling for frequent resharpening always pose a problem for the elementary teacher. Ordinarily, she does not have the necessary resharpening tools available, such as a tool grinder and oilstone. Even if she did, she probably does not possess the necessary technical knowledge and skill to perform this specialized task. The result is that the tool is used in a dull condition with disappointing results. The elimination of wood chisels and jack planes is a help. However, she may find a need for a low-angle cutting block plane. To keep the bit sharp, she may need to enlist the help of the industrial-arts teacher in the high school.

Workbenches

A most important item needed by the elementary teacher desiring to conduct handwork activities is a workbench. Here again her needs are specialized. She must have a bench that has the correct height. This height will depend upon the grade level in question. At the first grade level a 24 in. high bench is satisfactory with an additional inch added for each grade level. For the typical activity program conducted in the classroom one workbench with four work stations will ordinarily serve her needs. One of the most disturbing problems is the proper storage of the tools. The usual method of piling tools in any convenient drawer or in boxes, or hanging them on nails is unsatisfactory. Tool panels or tool cupboards on the wall are not the solution for the elementary teacher. Instead storage must be provided in the workbench in an organized manner. Typical industrial-arts workbenches are not the answer, as they are too high, too large for an already crowded room, too heavy to be moved about the room, and they lack proper storage facilities for the tools. It appears that her needs in a workbench are special and call for a special solution. Too, since her room is crowded, she needs a workbench so designed that it can be used for other purposes such as a table. Furthermore, this workbench must be attractive and in harmony with other furniture in the room. Instead, she often falls heir to workbenches that are of no further value to the industrial-arts department of the high school.

In the handwork experiences of children comes a time when they wish activities involving more than the use of their fingers as tools. They desire experiences with *honest-to-goodness* tools and more substantial materials of construction as wallboard, thin lumber, plywood, nails, cotter pins, sheet metal, etc. In the transition from less stable materials, such as clay, paper, and cloth, to the more stable items, problems can arise. There is danger that the child will be given lumber that is too hard and too thick; plywood that splits too easily, and is too hard; sheet metal that is too thick and hard to bend; nails that are too large for the existing need and too difficult to drive. Earlier it was mentioned that it was necessary to select tools of a size and type suitable for the maturity level of the child. So, likewise, must we select or make available materials of construction that fit the maturity level of the child.

The Type of Materials to Use

Materials such as wallboard are easily cut and can well be used by the child for first experiences in cutting and shaping. Silhouettes of animals, objects, people, and flowers are examples of projects that can be made of wallboard. White pine and basswood plywood can next be introduced as a material of construction. This material is best when used in ¼ in., 3/16 in., and ⅛ in. in thickness. In these thicknesses, it is adequately strong and it does not split easily. The use of fir plywood by children is most inappropriate for it is hard and chips so easily.

Another important consideration in the selection of solid materials for use by children is that this material must have its faces processed or finished at the time of their manufacture by someone possessing the necessary equipment. In other words, the child must not be expected to plane stock to thickness. The faces of the material should be adequately smooth as taken from stock so that it is ready to receive whatever decoration is desired. As a general rule it is enough of a task for the child to cut the edges and ends of the stock to the desired shape. But when stock of the thickness mentioned above is used this is a reasonable expectation of them. Stock of a greater thickness than ½ in. should be avoided.

The use of "sidewalk lumber" (crating) and scraps from any source is a most disturbing problem. Rarely is material from these sources suited to the needs and abilities of the children. Often these materials are too thick and too hard to be easily cut and shaped by the children. These materials nearly always result in frustrations and failures with tool work. This results in loss of interest in manipulative activities or a serious *letdown* in what was anticipated as a great deal of enjoyment. When this happens the teacher may drop this activity from her program. It may be more desirable not to attempt handwork with improper tools and materials than to do so and bring about failures with tool work.

The possible desirable outcomes of handwork in the education of children may be classified thus:

Primary: (*a*) development of tool subjects; (*b*) development of desirable habits, traits, and attitudes; (*c*) recreational — hobbies and interests.

Secondary: (*a*) manipulative skills; (*b*) projects.

There is evidence that with the proper use of handwork activities, the regular tool subjects as reading, writing, and arithmetic can be taught more effectively. Handwork activities create a need for reading to gather information to solve a problem of construction. Handwork activities create a need to measure, to use numbers in figuring material needs, and to record materials used. Handwork activities create a need for writing and in making written reports on the child's adventures in construction. Handwork activities give a child really something to talk about when it is time for developing oral speech. When there is felt a need, learning is stimulated and when learning is applied to a real situation the retention of that experience is increased.

Developing the Right Kinds of Habits and Traits

The development of acceptable habits, traits, and attitudes in the child is considered by some teachers to be as important as the acquisition of subject matter skills. An activity program lends itself admirably to observing the characteristics of the child. It is well recognized that when an individual has freedom his real self comes into play. During this freedom, the child's good or bad characteristics can be observed by the teacher. When undesirable traits are sensed, the teacher can plan appropriate action for correction or improvement. When the classroom is teacher dominated there is less opportunity to

make these observations and consequently less improvement in the development of desirable habits, traits, and attitudes. Handwork in the education of children encourages self-expression and an atmosphere of freedom so that all the children can become a part of the learning situation. It is difficult for the superaggressive child in the group or even the teacher to dominate the activity situation.

It appears our society is moving into a situation where children and adults want to be entertained constantly through commercialized activities. Witness the popularity of the television, movies, sports, etc. It could well be that our schools are not giving enough attention to teaching the child how to entertain himself. Reading is an excellent media for self-entertainment but it is wishful thinking to believe it will serve the recreational needs of most children. So the schools must look beyond reading as the only form of recreation for many children. Handwork activities can make an important contribution here if only the boys and girls are given an introduction to it in the schools. It can be wholesome as well as profitable.

It is optimistic to believe that manipulative skill can be an important outcome of handwork activities in the elementary school. Skill is the product of drill, and there will not be enough time for drill to hope for much development of skill. However, it is important that the teacher give instruction in the correct use of the tool to avoid the necessity of reformation of bad habits at a later date. Therefore, as an outcome of handwork in the development of children it is well to consider manipulative skill a secondary one.

To the child a most important outcome of handwork will be the project whether it might be utilitarian or otherwise. The anticipation of making something is the stimulating factor for him. The question often arises as to the length of time he should work on a project. The ideal length of time necessary to construct a project might well be — one that he can start today, make today and take home tonight. While this is not often possible it does match his interest span which is short. So at least a part of his handwork activities should be devoted to individual projects which can be his own work and he knows it. Then for the child the project probably will be the important end result of the activity, while for the teacher it will only be a means to an end.

It must be recognized that not all of the outcomes of handwork are assured as being good. There can be some which are undesirable, as development of poor work habits. These poor work habits often can be laid to the use of improper tools and materials, and to the failure of the teacher to provide correct instruction in the use of the tools and materials. Children need instruction in how to hold and use tools correctly. They should not be left to their own devices to invent these procedures. If permitted to do so, they are likely to be incorrect. When this is the case, the child experiences all kinds of failures in his cutting, shaping, and forming of materials. Usually he is intelligent enough to know that he is not doing so well so he decides that tool work is not for him. This merely adds to the string of school failures for him and also adds to his inferiority complexes.

Another undesirable work habit that may develop is the failure to put back tools and materials where they belong, assuming a place has been arranged for them. This is a matter of good school citizenship. They should learn to work together, take their turn in the use of tools and clean up the disorder which they have created. Should the teacher fail in her responsibilities along this line, then handwork activities can be a contributing factor to poor work habits.

The elementary teacher needs to be on guard that too much time is not devoted to handwork activities at the expense of the regular school subjects. Children may prevail upon her frequently to permit them to engage in handwork activities. If she is tactful she can convert this situation for the good of the regular school subjects. However, she should not use it as a disciplinary device by denying the child these experiences if he does not measure up to expectations in other subjects.

Analysis will show that if handwork is contributing to undesirable outcomes in the education of children, one or more factors are in error and need correction. Briefly restated they are: The use of improper tools and materials; the failure of the teacher to provide the necessary instruction in the use of the tools and materials; failure of teacher to have pupils restore order when finished with work; and permitting pupils to spend too much school time on it to the neglect of regular school subjects.

Summary and Conclusions

The successful conduct of handwork in the elementary school is largely dependent upon the teacher possessing an understanding of the purpose and nature of the work. She must be ever conscious that its greatest benefit can accrue from using it as a teaching device for the regular tool subjects. It loses much of its value if it is allowed to become an end in itself. So it becomes very necessary that the teacher in charge of this work be thoroughly grounded in this philosophy, whether she is the regular teacher or a special teacher. As a general observation, it is much more desirable that this work be conducted by the regular teacher than by the special teacher.

A second factor most important for the successful conduct of handwork is the making available of suitable equipment and supplies. The same care and attention is necessary in the choice of these items as is given to the selection of text and reference material. The child is no more adult in his tool abilities than he is in his reading abilities.

A third important factor in the successful conduct of handwork is provision for the proper and adequate storage of supplies and tools. Proper storage of tools can be obtained by the purchase of a self-contained workbench in which systematic tool storage is provided. The elementary classroom is not adapted to the conventional workbench requiring wall cupboards for tool storage. Proper storage of materials and supplies needed for construction activities can be provided through the purchase of suitable cabinets and cases.

A fourth factor in the successful conduct of handwork is that when tools and materials are made available to children for use this should not be done without providing instruction in their manipulation. A number of teacher education colleges now offer courses in handwork to those pursuing the curriculum for the preparation of elementary school teachers. The teacher's needs for instruction and skill in the use of tools is moderate for the variety of hand tools to be used is not great. Usually this can be acquired in one or two courses in her program. Instruction in the use of tools will produce more satisfactory projects, will make for greater safety, and will establish better tool technique.

If any degree of skill is to be acquired, there must be opportunity provided for drill work. Since children like activity, they will not need urging to do tool work; the only consideration will be that of permitting them to have access to the tools for construction. Some of this can be permitted before and after school hours as well as during the school day.

A giant tank truck can be loaded with gasoline at the rate of 400 gallons a minute — that's a load of 5000 gallons in less than 15 minutes — *Petroleum Newsnotes*

A Significant Study—

Community Factors Determining Industrial Arts Instructional Areas

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Through an analysis of literature related to the subject, a list of community factors, meeting certain criteria, was obtained. The list was then submitted to a pilot committee of industrial-arts instructors interested and involved in educational research in order to secure their opinions relative to the comprehensiveness of the list and the construction of a questionnaire format.

The data used in this study were provided by two groups of individuals. It is based partially upon information obtained from a jury of specialists composed of 12 men who are well established and well known in the field of industrial-arts education. The remainder of the data was secured from 212 instructors currently teaching industrial arts in the state of Michigan. Their teaching experience ranges from 6 months to 47 years, and the sizes of the school systems they represent range from Class A through Class E.

Each group was asked to indicate, by means of a five-point rating scale, the significance they believed each community factor should possess in determining the instructional areas of an industrial-arts program. In addition, the industrial-arts instructors from the state of Michigan were requested to indicate the significance each factor actually possessed in determining the instructional areas of their industrial-arts programs. Statistical treatment of the information thus obtained provided the basis for certain conclusions.

Significant Community Factors

Based upon the opinions of both the jury of specialists selected from the field of industrial-arts education and the industrial-arts instructors from the state of Michigan, there are certain community factors that should be highly significant in determining the instructional areas of an industrial-arts program. The following 13 community factors, listed in order of significance, comprise this group:

1. Financial prospects for industrial-arts equipment.
2. Financial ability to obtain desired materials and supplies for the industrial-arts program.
3. Financial prospects for industrial-arts space.
4. Attitude of the school board toward an industrial-arts program.
5. Training possessed by the industrial-arts teaching personnel now employed.
6. Attitude of the school administrative officers toward an industrial-arts program.
7. Probable number of students to be enrolled in industrial-arts in the foreseeable future (long range planning).
8. Kinds of industrial-arts equipment present.
9. Proportion of dropouts that go into industries, service trades, professions, business, and farms.
10. Kinds of industries present in the community.
11. Financial prospects for hiring industrial-arts teaching personnel.
12. Leisure time activities of the students of the community.
13. Culture of the community (whether the community is progressive and dynamic or static and opposed to change).

Another group of community factors should, in the opinions of both the jury of specialists selected from the field of industrial-arts education and the industrial-arts instructors from the state of Michigan, possess a moderate degree of significance in determining the instructional areas of an industrial-arts program. They are the following 11 community factors which are listed in their order of significance:

1. Raw materials used or created in the community.
2. Business enterprises present in the community.
3. Proportion of pupils that leave the community after completing their education (graduates and dropouts).
4. Reading habits of the students of the community.
5. Whether the industrial-arts courses are taken by students because no other course appears suitable for that student. ("He doesn't fit anywhere else.")
6. Reading habits of the adults of the community.
7. Dominant dwelling type of the community (apartments or homes).
8. Social rapport of the community (whether friction is created by special interest groups and pressure groups or whether the community is united for the common good).
9. Transportation facilities serving the school.
10. Ratio of persons in the upper, middle, and lower class status.
11. Public transportation facilities serving the community.

Some of the community factors that were selected for use in this study appear to be of little value in determining the instructional areas of an industrial-arts program. Both the jury of specialists selected from the field of industrial-

arts education and the industrial-arts instructors from the state of Michigan have indicated that the following 3 community factors possess very little significance in this respect:

1. Percentage of nonwhites in the community.
2. Percentage of foreign-born persons in the community.
3. Sex ratio (as affects birth rate, death rate, and marriage rate).

Community Factors That Need Further Study

Of the remaining 25 community factors which were selected for use in this study, there appears to be a difference of opinion between the jury of specialists selected from the field of industrial-arts education and the industrial-arts instructors from the state of Michigan as to the significance rating they should possess in determining the instructional areas of an industrial-arts program. Since they have been rated as being significant to some degree by either the jury of specialists or the industrial-arts instructors, or by both groups, they apparently cannot be overlooked in the process of inaugurating or evaluating an industrial-arts program. Thus, for the following community factors further study seems warranted:

1. Number of people inhabiting the community.
2. Population age trend (whether the average age is rising or falling).
3. Number of industries present in the community.
4. Sizes of industries present in the community.
5. Assessed valuation of the community.
6. Area of the community.
7. Geographic location of the community.
8. Existing industrial arts space available.
9. Amounts of industrial-arts equipment present.
10. Attractiveness of the community for hiring and retaining industrial-arts teaching personnel.
11. Proportion of graduates that go into industries, service trades, professions, business, and farms.
12. Number of industrial-arts students per class.
13. Probable number of students to be enrolled in industrial arts in the immediate future.
14. Number of girls enrolled in industrial arts.
15. Leisure time activities of the adults of the community.
16. Hobbies of the students of the community.
17. Hobbies of the adults of the community.
18. Recreational pursuits of the students of the community.
19. Recreational pursuits of the adults of the community.
20. Occupations of the adults of the community.
21. Attitude of the other teachers toward an industrial-arts program.
22. Attitude of the citizens of the community toward an industrial-arts program.
23. Whether the industrial-arts courses are taken for vocational or for general educational purposes (even though the program is designated as industrial arts).
24. Meaning of industrial arts in general education as understood by the community.
25. Meaning of industrial arts in general education as understood by the school personnel.

The over-all rank-difference coefficient of correlation between the opinions of the jury of specialists selected from the field of industrial-arts education and the opinions of the industrial-arts instructors from the state of Michigan relative to how significant the community factors should be in determining the instructional areas of an industrial-arts program is .63. This seems to indicate a moderate degree of agreement as to the rank order granted the community factors by the two groups of participants.

By comparing the average of the mean values assessed the group of community factors in this respect by these two groups of participants, another possible aspect of the study is revealed. The average value granted the list of community factors by the jury of specialists amounts to 3.21, whereas the industrial-arts instructors granted them an average value of 3.58. This would seem to indicate that the industrial-arts instructors consider the community factors to be of greater importance in determining the instructional areas of an industrial-arts program than the jury of specialists.

According to the high rank-difference coefficient of correlation obtained, it appears that, in general, the community factors selected for use in this study are being considered in an order acceptable to the industrial-arts instructors from the state of Michigan relative to determining the instructional areas offered in the industrial-arts programs. A coefficient of .95 was obtained when the rank orders were compared between the significance the industrial-arts instructors believed the community factors should possess in determining the instructional areas of an industrial-arts program and the significance they actually possessed in determining the instructional areas offered in the industrial-arts programs of the school systems which employed the participating industrial-arts instructors.

However, when the average of the mean values granted the community factors in this respect are compared, a greater difference is bared. The average value, on a 1 to 5 scale granted the community factors by the industrial-arts instructors relative to how significant the community factors should be in determining the instructional areas of an industrial-arts program is 3.58, whereas in the actual practice of determining the instructional areas of an industrial-arts program, the industrial-arts instructors granted them an average value of 3.14. Thus, it appears that in actual practice the significance of community factors selected for use in this study is not being considered to the degree desired by the industrial-arts instructors from the state of Michigan.

From the various aspects of industrial-arts education encountered in this study it would seem desirable to continually evaluate each industrial-arts program. The evidence assembled in in this report indicates that certain community factors should receive prime consideration in this respect. Therefore, in the process of inaugurating or evaluating an industrial-arts program, it is suggested that the community factors elaborated in this report be included in the criteria used to determine the instructional areas of such an industrial-arts program.

"PETRO" — THE GREATEST CHEMICAL OF THEM ALL

Petrochemistry, virtually unknown two decades ago, is a three billion dollar industry today. Currently, nearly 3000 chemical substances are being made out of oil and natural gas, and new ones continue to pour out of oil and chemical industry laboratories at the rate of 400 a year. Chemicals from petroleum now account for nearly 25 per cent of the nation's production of organic chemicals. Experts believe that within the next ten years, fully 50 per cent of our chemicals will be derived from oil and natural gas. Petro-chemicals are truly the materials for modern living; products such as detergents, man-made rubber, and plastics are making vast contributions to the comfort and security of every American. — *Petroleum Newsnotes*

Varieties of generators used in Army combat vehicles have been reduced from the 266 of World War II to only five; and varieties of starting motors from 63 to 8. — *Wisconsin Military District Public Information Office.*

A Job for the Class in Electricity —

Build Your Own Special Transformer

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A transformer was needed to give 1 ampere at 30 volts, 60 cy. and no local supply house had one in stock nor could they promise one promptly. It was then decided to build our own and this proved to be much easier than anticipated.

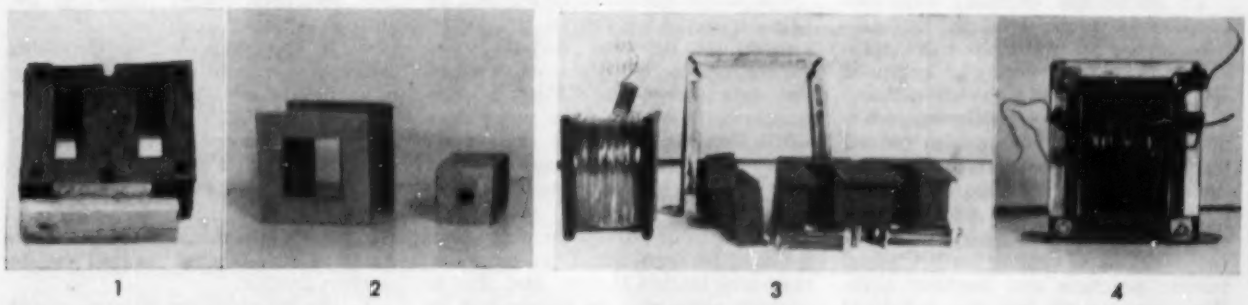
The transformer needed would have to have a power output of 30 volt amperes and an old burnt-out transformer of about the same capacity was located among the castoffs in the *odds and ends* box. This was pulled apart, the burnt windings scrapped, and the silicon steel laminations and bolts salvaged and cleaned, for these were the parts needed.

There are several ways of calculating the wire sizes and number of turns for a transformer and some of these are quite complicated and are needed for large expensive transformers but for small ones which do not have to have high efficiency and are used only intermittently there are some easy simple methods which give very satisfactory results. The line voltage at the shop is 115 v. a.c. at 60 cy. A good transformer constant for this voltage and frequency is 800 and this figure divided by the cross section area of the silicon steel laminations inside the winding will give the required number of primary turns. The cross section of the selected laminations, when tightly clamped, measured 1 by 1 in. which is an area of one square inch. Dividing 800 by 1 is 800 and this gives the required number of turns for the primary winding. The efficiency of the proposed transformer was estimated at .85 which made the input current: $\frac{1 \text{ amp.} \times 30 \text{ v.}}{115 \times .85} =$ .307 amps. The primary wire, therefore, must have sufficient area to carry this current. A current density of about 1500 amperes per square inch is suitable for small transformers which are to be used intermittently so the primary copper wire needed should be approximately $\frac{.307}{1500} =$ .000204 sq. in. The nearest even sized wire to this is No. 26 and this size was used for the primary winding.

The salvaged laminations were designed to provide a winding area for both primary and secondary windings of $1\frac{9}{16}$ in. wide by $\frac{9}{16}$ in. high with 1 by 1 in. of laminations inside the the coil. See Figure 1, which shows the laminations piled as they will be later when assembled inside the winding bobbin, this space, of course, can not be exceeded and also must include the necessary insulation. A bobbin on which to wind the primary and secondary was needed since the original bobbin was damaged so a new one was made out of hard pressed gray board $\frac{1}{32}$ in. thick. (This is the cardboard we use for the index in filing cabinets.) This bobbin reduced the winding space to $1\frac{1}{2}$ by $\frac{1}{2}$ in. or a cross section of .75 sq. in. The winding next to the core is best protected against damage so it was decided to wind the No. 26 primary first so as to protect the 115 voltage winding against contacts and shorts.

The secondary current had to be one ampere and at 1500 amperes per square inch this required a secondary wire area of $\frac{1}{1500}$ or .000666 sq. in. The nearest larger even size copper wire is No. 20, so this size was chosen. The number of turns required for the secondary must be proportional to the desired voltage or $800 \times \frac{30}{115}$ which is 209 turns. Since the winding space is rather restricted it was decided to use enameled wire and thus make the winding as compact as possible.

The tables given in most electrical handbooks show that for No. 26 enameled copper wire the number of turns per sq. in. is 3306, so the 800 turns required for the primary take $\frac{800}{3306}$ or .242 sq. in. thus leaving a space of .75 — .242 or .508 sq. in. for the secondary winding and the strip insulation. No. 20 enameled wire winds 858 turns per sq. in. so the 220 turns required take .257 sq. in. and this subtracted from the .508 sq. in. of space remaining leaves .251 sq. in. for the insulation between layers and the outside protection cover. This indicated that if the windings were carefully done then sizes picked would provide the required space for them.



1 2 3 4

Fig. 1. The salvaged laminations. Fig. 2. The winding bobbin. Fig. 3. Assembling the parts of the transformer. Fig. 4. The assembled transformer

The winding bobbin, as made of 1/32 in. hard cardboard, is shown in Figure 2, but it was too flimsy to wind the wire on so a piece of wood with a hole in the center, to slip over the winder shaft, was cut and sanded so as to fit snugly inside the bobbin; wood pieces were placed over the ends to support the cardboard cheeks and all parts were then clamped on a coil winder.

The No. 26 primary wire was started by leaving about 6 in. projecting on the left side, for future connections. Then the wire was continued down the bobbin cheek inside and across the bottom. This arrangement made sure that the following turns would clamp and firmly hold the end from slipping. Next a strip of .007 in. thick plastic tape was placed over the wire, to give additional insulation protection, and the primary winding of 800 turns was carefully wound in smooth layers with a strip of plastic tape laid over each layer to hold the wires in position. After the 800th turn, the end was brought out, also on the left side, and a single layer of plastic tape held the completed winding in place.

The secondary winding of No. 20 enameled wire was next completed in the same manner as the primary except that the start and finish were both on the right side thus keeping the leads to the two windings well separated and both on the same outside face of the transformer. The 209 turns did not quite complete the last layer and since a little higher voltage would be advantageous the winding was continued to 226 turns to neatly finish the job. A layer of plastic tape was then wound over the final layer of wire. The wood core was removed and the bobbin was then ready for the final assembly of the transformer. All parts are shown in Figure 3.

To place the laminations in position the bobbin was laid on one side and then the laminations were slipped in place; first from the right and then from the left until all the laminations had been replaced in a similar manner to the original assembly. The clamping bolts were then slipped in position and carefully pulled tight by working around the four bolts so all were tightened uniformly. Then the transformer was given a test and the results tabulated as follows:

Resistance between primary and secondary	Infinite
Resistance between primary laminations	Infinite
Resistance between secondary laminations	Infinite
Input voltage on test	120v. a.c.
Output voltage on open circuit	33 a.c.
Output voltage with 1.2 amp. flowing	30 a.c.
Output voltage with 2.7 amp. flowing	27 a.c.

The approximate cost of the completed transformer, as shown in Figure 4, was about $2.

Harmonizing Theory and Practice —

Industrial-Arts Objectives at the Junior High Level

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Summary

Teachers disagree with supervisors and teacher educators on the following:

1. Teachers do not or would not prefer mixed classes of boys and girls in industrial arts.

2. Teachers in 85 per cent of cases feel that an elementary drawing course is essential before students start their shop classes, while only 50 per cent of the supervisors and teacher educators believe so.

3. Teachers feel that if they were to take additional college courses in industrial arts they would be more interested in specific project development, rather than demonstrations of teaching techniques or information regarding recent trends in industrial-arts education.

Teachers, supervisors, and teacher educators, reach a uniform and nearly unanimous agreement on the following items:

1. All pupils should be required to complete an assigned project before starting another.

2. The industrial-arts program should start at the 7th grade in Junior High School.

This article presents a brief summary of a study made to ascertain the objectives of industrial arts at the junior high school level.

To gather the necessary data two questionnaires were developed that contained items believed to cover the main objectives and philosophy of industrial arts at the junior high school level. The first of the two questionnaires was mailed to 162 junior high school teachers of industrial-arts subjects in the metropolitan Bay area. The teacher questionnaire contained two types of questions, totaling 80 questions in all: (*a*) questions dealing with actual teacher practices and teaching situations experienced by the individual teacher, and (*b*) questions dealing with theory regarding what the individual teacher felt would be the most desirable practices to follow for the further development of an adequate industrial-arts program.

The second questionnaire was sent to 12 supervisors of industrial arts in the metropolitan Bay area; and to 59 industrial-arts teacher educators in ten of the state colleges in California. The questionnaire sent to these two groups asked that the individual express his theory regarding the *same* questions asked the teacher in the teacher questionnaire.

This made it possible to make comparisons between actual teacher practices and teacher theory; and also to compare these with the theory held by the supervisors and teacher educators regarding the *same* questionnaire items.

3. All boys should be required to take at least three semesters of industrial arts. Fifty per cent of the teachers said this was required at present.

4. The three most important industrial-arts courses are wood, metal, and planning and drawing.

5. The required industrial-arts classes should be limited to one period per day, or between four and five clock hours per week (practice in 99 per cent of the cases at present).

6. The maximum class size for industrial arts should range between 20 and 25 pupils. Thirty-five per cent of the teachers state that they have one or more classes exceeding this figure.

7. Each industrial-arts teacher should be provided with at least one preparation period per school day. Seventy per cent are receiving this at present.

8. Girls should also have an opportunity to study industrial-arts subjects. Twenty per cent of the teachers have girls in one or more of their industrial-arts classes.

9. Visitations by the industrial-arts teachers to other schools to observe industrial-arts classes while in operation would be of greater benefit to the teacher than *any* of the following: summer school, reading, field trips, summer work in industry or curriculum committee work.

10. Standardization of basic industrial-arts course content within a given school district; and discussions of possible solutions to common classroom teaching problems are of prime importance and rank above either project development or demonstrations.

11. Eighty-four per cent of the teachers questioned, hold that it is very much worth-while to have teacher committees to work on industrial-arts curriculum committees.

12. Eighty-four per cent of them also favor the development of basic course outlines for beginning shop classes within a given school district.

13. Current revision of the industrial-arts curriculum is now taking place according to 80 per cent of the Bay area teachers and supervisors.

Miscellaneous

1. Seventy per cent of the junior high school industrial-arts teachers stated that they find it *financially necessary* to seek outside employment during their spare time.

2. Twenty per cent of the junior high school industrial-arts teachers are teaching one or more classes outside of the industrial-arts field.

3. Seventy-five per cent of the teachers would like additional supervisory aid in the form of teacher-supervisor consultation *outside* of classroom teaching; while only 23 per cent would like additional aid in the form of classroom observation.

4. Seventy-three per cent of the Bay area teachers state that there is an industrial-arts curriculum committee functioning within their respective school district.

Shop Teachers Must Learn How to Assist —

Maladjusted Students in the School Shop

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It is becoming increasingly apparent that the industrial-arts instructor should be not only a shop teacher but also a practical psychologist. To give an adequate picture of this statement we shall say that his teaching day is replete with unique situations, shop techniques, demonstrations, a variety of student behavior patterns, and countless other incidents.

When a student becomes known as a maladjusted individual, the principal's and counselor's first thought is to place him in the shops regardless of the fact that few boys with decided mental maladjustments have an aptitude for industrial arts. Distasteful as this system of "dumping" may be, it is nevertheless true. The shop teacher sometimes becomes aware of the situation and attempts to send the student back to the office with a note to the effect that this type of individual would be a poor risk in the industrial-arts class; but almost immediately the unfortunate teacher is reprimanded. The boy is back in the shop, maladjustments and all. It is, in short, a catastrophe, and the instructor is faced with just another problem.

Right away points of friction arise between the student and the teacher, and usually between the student and the rest of the class. These points of friction take the form of many psychological variations. It is important that the teacher know these typical behavior patterns, for the lack of early detection and remedial action often results in disastrous consequences. The following is a list of traits that are most serious from the shop teacher's standpoint:

Disobedience
Obscene talk
Untruthfulness
Stealing
Cruelty, bullying
Destruction of materials and property
Unreliableness
Temper tantrums
Lack of interest in work
Profanity
Impudence, rudeness
Tardiness
Inordinate desire for attention
Stubbornness
Domineering attitude
Sullenness
Suspiciousness
Thoughtlessness
Unsocial behavior
Inability to read or write
Class interruption
Being overly critical of others

Disorderliness in class	Superior attitude
Dissatisfaction, depression	Smoking
Easy discouragement	Impertinence, defiance
Selfishness	Truancy
Carelessness in work	Fault finding
Inattention	Belligerence
Quarrelsomeness	Slovenliness
Resentfulness	Unsatisfactory workmanship
	Disregard of safety precautions

Appeasement, punitive measures, temporary expulsion, and reduction of group activity usually result in a partial or complete breakdown of the shop program. Therefore, the teacher must view the problem from the standpoint of a psychologist even though he is hampered by the inability to cope with the cause of the student's abnormal conduct. The principal, counselors, and school psychologist have the time and facilities to analyze the cause, but the shop teacher has neither and meets with difficulties if he does attempt to peer and pry into the maladjusted pupil's home or private life. There is no alternative but to solve the problem without reference to the cause — a solution which nearly defies logistical reasoning.

In mathematics we learn that all definitions are reversible. Thus we may say that "a perpendicular is a line that forms a right angle with another line," or "a line that forms a right angle with another line is a perpendicular." Each of these definitions is a converse of the other, and both are true. The teacher's solution to the problems presented by the maladjusted child lies in this converse approach. The obvious answer that the instructor desires is a well-adjusted individual. The real problem is the method of bringing about this normal behavior pattern — difficult task, but it can be accomplished.

Success in developing normal responses often depends upon only a few well-planned stratagems. And surprising as it may seem, they may completely eradicate all traces of maladjustment. Frequently this treatment will cause behavior improvement in other classes as well. These stratagems have proved effective in many cases:

1. Select projects for the student according to their therapeutic value.

A student who cannot read or write cannot make detailed and accurate project drawings. The instructor does not have the time to teach reading, writing, arithmetic, and mechanical drawing. If the boy is enrolled in the metal shop, for example, the teacher can get him interested in foundry work by providing ready-made patterns and a minimum of instruction. The cast project usually entrances the student without making him ashamed of his inability to read or write. He becomes so engrossed in the operation of smoothing, buffing, and polishing that he forgets his personal problems. There are hundreds of such projects that do not require detailed drawings.

2. Provide projects which appear intricate, but are easy to construct.

The teacher should choose a project for the student that when completed will appear to set off the maladjusted student as a mechanical wizard. A simple one tube radio set, for example, will do the necessary job quite thoroughly. When the set is completed, the instructor can always manage to recruit a few important personages such as the principal, superintendent, or supervisor to listen to and appreciate the student's accomplishment in the presence of the whole class. This satisfies his desire for attention and public approval.

3. Stress safety precautions.

Teach and stress safety precautions in the shop. Safety is an important part of the shop curriculum not only for safety's sake, but for psychological reasons. Let us imagine that one of the smartest students in the shop carelessly uses the grinder without goggles or an eye shield. The maladjusted pupil well versed on safety will immediately take advantage of the situation and cause quite a commotion by insisting that the boy at the grinder don the proper safety equipment. He becomes a safety expert. The teacher can take advantage of this and entrust the problem student with numerous safety tasks which may range from grinding and smoothing mushroomed chisel heads to constructing a wooden handle with a magnet attached at one end for the purpose of picking up tiny bits of tin or steel from the floor.

4. Be tactful.

A shop teacher must be a good diplomat when coping with the problem child. He must be firm, use no appeasement, decide the proper course of action without causing offense, and show no prejudice or favoritism. Adolescents resent being made to obey blindly because of fear. Most of them are rather hard to scare anyway. When you tell a maladjusted student to do something, he will usually rebel against authority by becoming angry. If the student uses this behavior pattern, you do not have to snap him out of it by threatening punishment or agreeing to his demands. When the boy screams "I hate you," he actually means just that. It is far better for the student to express his feelings this way than to bottle them up inside. If he is afraid of giving vent to his anger because of being punished, he may harbor resentments that eventually may lead to real and lasting maladjustment. Therefore a reverse psychology is needed. Talk quietly to the boy about the foolishness of becoming angry. Then make the whole affair a sort of a game by daring him to become angry in the future. This will cause the problem student to accept the challenge and refrain from becoming emotionally disturbed just to spite the teacher or to prove that he is more stable than the teacher.

5. The shop instructor should make teaching aids and devices.

Teaching aids and devices develop the interest of the student. A tumbling barrel for polishing small projects in the craft or metal shop will catch the eye. A production jig used for bending will cause the pupil to assume a professional air when working. Positive slide pictures taken of the student and his project with a Kodak 35 or Argus C 3 camera will transform a boy from a "tough guy" into a "big shot," the center of attraction. Slides, film strips, and movies may be shown in the shop in broad daylight by constructing a simple projection box of wood, mirrors, and ground glass. This will eliminate the whole class's going to the auditorium to view a lengthy film. The shop teacher must remember that the mentally maladjusted have short attention spans. Long movies, demonstrations, and lectures are not relished by the maladjusted child, and he is constantly in fear of being asked a question he cannot answer.

6. Instruct the problem student carefully on the use and care of shop machinery.

The teacher needs to give the maladjusted student extra instruction concerning the use and care of the machine that he desires to work with. Showing him how to use, oil, clean, and set up work on the metal lathe, for example, will cause him to imagine that the machine is his very own. He feels that he has an important part in the care and upkeep of the shop equipment.

7. Be a public relations man.

Do not make the problem student a public example and a school menace by calling three strikes against him before he gets up to bat. Show him that class acceptance is there for him to claim, and if he is willing to act according to group rules, he need not lose his identity. Caution the more aggressive youngsters in the class against being rude to him. Show them that he needs friends and affection. Take advantage of the maladjusted student's "leadership" and imagination. Give him special opportunity to use them in good and constructive ways by entrusting the important task of checking the tool room at the close of the period to him.

Any number of such tasks can be considered. Point out to the boy that the same processes and techniques that he uses in the shop are also used in factories. This will not only assist him in preparation for earning a living, but will develop self-importance.

8. Assist the student to properly use his leisure time.

Encourage the student to work on his project at home during leisure time by simply supplying him with a few pieces of sandpaper, emery cloth, or steel wool. He not only smooths and polishes his project, but feels proud when his parents observe him doing so. [In the neighborhood where this writer teaches it helps to keep the student off the streets and away from bad company after school.] Puzzles and games constructed in the shop are also invaluable in encouraging the proper use of leisure time.

9. Present a calm appearance.

Nervousness and irritability can easily be transmitted from the teacher to the maladjusted student when there is a close continuing contact between them. The shop instructor must have a relaxed, calm appearance in order to avoid inflicting nervousness and irritability on their students.

The symptoms and remedial suggestions mentioned in this article will assist in understanding and aiding the maladjusted shop student. Each case can be solved, and this presents a challenge to every industrial-arts instructor in the nation.

Introducing Interest Into the Printing Course —

A Student Publishing Company

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This program is designed primarily for advanced students who are taking graphic arts for the third or fourth semester. The object of it is to give the students an idea of what is involved in the production of a complete book.

There are a great many skills and learning experiences involved in this program. Examples of these are: the looking up of reference material, flush left and right composition, word division, proofreading, composition correction, page layout, page make-up, imposition, lock-up, presswork, linoleum block cutting, four color registration, silk screen printing, studio photography, contact printing, enlarging, print mounting, stock cutting and figuring, book trimming, page assembly, and case binding. The experiences involved in

Fig. 1. Each student does research in his own particular interest area. Some of the material was gathered by two or three students working together. Fig. 2 (at right). Each student sets his own copy and corrections. After the press run is made he is also responsible for distributing his own type

Fig. 3. A proofreader goes over a final galley proof before putting the page to bed. Across the table the photo editor checks prints for mounting. Fig. 4 (at right). After the layout editor has checked the page for consistency, each makes his own lock-up and press run

this project need only be limited by the individual course being offered.

The program begins with each student doing a short research paper on the particular area that interests him in the field of graphic arts. When this paper has been approved he sets the entire article in type. The student then submits his proofs to the proofreaders. When all corrections have been made he locks up and makes his press run.

When all of the press runs are completed the finished pages are gathered and bound together. The books are then trimmed to the proper size and mounted in the cases.

The entire operation is set up so as to follow industrial procedure as closely as possible. Each student or group of students does a part of the writing and type setting for the book aside from his assigned production line or editorial duties.

There is much interest created in this project because, at the end of the semester each student takes home with him a printed and bound book with his name on one of the articles. The fact that the book looks very commercial when completed means a great deal to the students.

The first consideration for setting up this program is the choosing of material to be written for the book. Due to the fact that we are dealing with advanced students, choosing research material does not present much of a problem. By the time a student has had three or more semesters of graphic arts, he has generally found a particular area that interests him more than the others and, as a result he is usually more than willing to do further work in that area. It seems to work out better if two or three students choose to work on the same topic. In this way they can combine ideas and generally come up with some very good material.

The research material is obtained from books in the library and reference books that are in the shop.

It has been found best to set definite deadlines for all of the operations involved, including the presentation of the written material. The deadline gives the students the feeling of working

Fig. 5. The gathering crew assembles the individual pages for the binding operation. Fig. 6 (at right). Here part of the bindery crew adds ends sheets and super to the stitched pages

Fig. 7. The hard covers are mass produced by the case making crew. Regular binders cloth is being used over chipboard. Fig. 8 (at right). The finished product is a very commercial looking publication and stimulates a great deal of class pride

against time just as they would be in an industrial situation.

The second organizational item is the setting up of the editorial and production staff. The best policy for this is for the instructor to appoint the students to these positions. The reason for this being again, that this is an advanced class and the instructor will know many of the students, and will also know their capabilities. It will be much better for a student to succeed in a minor job than to fail in an important job.

The editorial staff will depend on what kind of graphic-arts program is in operation. The assumption will be made for the purpose of this article that it is a full graphic-arts program including photography.

The staff assignments should all be made at the same time, and very early in the semester. In this way all of the students will know what is to be expected of them, and will be ready to do it when the time comes.

The first and perhaps one of the most important positions to be filled will be that of manuscript editor. This will probably require at least two students. Needless to say these editors should be good spellers and also pretty fair English students. This job consists of reading over the manuscripts as they are finished and making grammar and spelling corrections. When the corrections have been made the manuscript is submitted to the instructor with the initial of the manuscript editor. The instructor will make the final approval and initial the manuscript. It is only then that any type may be set for the material.

With the setting of the type the need for proofreaders becomes apparent. These students will mark the proofs and send them back to the individual compositors for corrections.

With the addition of photography the need for another editor has been added, the photo editor. It will be the responsibility of this student to check the quality of each print before it is mounted in the book.

The last editor on the staff will be the layout editor. It will be his duty to check all page layouts for consistency before the press run is started.

The next position that must be filled is that of production manager. The student chosen for this post must be reliable and have a good knowledge of imposition, lock-up, and presswork. The duties of the production manager will consist of seeing that all materials are ready when they are needed, checking all lock-ups before they are put to bed and approving all press runs. He may be assigned an assistant to work with him if there are several presses to check.

The next in line is the rest of the production staff which should take up the remainder of the class. There should be several students for gathering, several for stitching, several for padding, a couple for trimming, and about four to six for case making, four for final assembly and three or four trouble shooters.

The trouble shooters will fill in on any of the operations when there are students absent or where a bottleneck develops.

In this project each student is given a responsible position and with each student rests the success or failure of the finished product. This gives each person a feeling of importance and an incentive to do his very best, because the finished job belongs to the entire class and not just to one person.

The next time you have an advanced class coming up and you are in doubt as to what to offer them, give this program a try.

PLASTIC SALVES IN PLASTIC JARS

Polyethylene, one of the most versatile products to come from oil industry laboratories, is opening up new horizons in the field of pharmaceuticals. Previously used to make unbreakable containers for medicines, it now has found its way into the jar as a base for antibiotic salves and ointments. Tests show that polyethylene-based ointments retain their spreadability even under extreme temperature changes, and release more medicine over a longer period of time than conventional salves. The new base is probably the latest way in which medicine gets a helping hand from petroleum in keeping Americans healthy and happy. — *Petroleum Newsnotes.*

INSECT, SPARE THAT TREE!

Insects and disease are the greatest enemies of the nation's forests, destroying almost three times as much standing timber as fire. Foresters are able to save millions of trees from destruction every year with the help of powerful new insecticides and weed killers such as DDT and 2,4,-D which are produced by the petroleum industry. These chemicals from petroleum play an important part in helping America's 664 million acres of forest land grow timber faster than it is being used. — *Petroleum Newsnotes.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

SOME LAST-HOUR REMINDERS

IF YOU have not already done so, notify the circulation department of The Bruce Publishing Company of your new address for the school year 1956–57. Failure to do that may cause you to lose one or more issues of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine.

Do you make use of the "Readers Service Section" offered monthly by this magazine? If not, you will find it to your advantage to try it.

This section is usually placed on the last two pages inside of the rear cover. Two easy-to-use, postage paid cards also are included. This will help readers in requesting information about materials, equipment, and supplies which they may need to carry on their teaching. These cards are perforated so that they can be easily and quickly detached for mailing.

Have you listed some of the principal items that you want to take up with your new students on the first day of school? Being prepared will have a good effect on the new students and will be of inestimable help to the teacher.

Do not forget to call your students' attention to the many opportunities offered in the school shop to learn safe practices in using hand and machine tools.

It is well to call attention to these dangers right from the start. Some instructors maintain that it sets up unwholesome fears in the student, but if the warning prevents one of them from receiving an injury, the fears may be looked upon as being salutary.

THE BLIND SEE

THE Veterans Administrative Service has furnished a few more success stories that may interest your students. The material may well be used on your bulletin boards. One or the other of the stories may contain the spark that will put new life into someone ready to succumb to despair brought about by an injury that seems to mark the end of all future happiness.

The first of the cases mentioned in the Veterans Administration release speaks of a war-blinded veteran who now heads the speech department of a large college. He teaches eleven hours a week, prepares lessons for his classes, and manages the college debate team. Besides that he is engaged in other work which keeps a full-time secretary, an instructor, and a graduate student who reads to him, quite busy. His wife grades his papers.

Then there is a blinded veteran who is an instrument maker for a firm. A delicate sense of touch, a Braille micrometer, and the ordinary tools of his trade assist him in his difficult work.

Another similar case is a veteran who has become a lawyer. He has been elected to the state legislature. He employs a secretary and a reader to gather research material for him. He handles all kinds of legal work from civil to trial cases.

These are just a few cases out of a total of 388 totally blinded World War II and Korean veterans.

The study shows that these blind veterans have courageously entered many occupations which have, up till now, been looked upon as definitely requiring vision. Thirty-eight per cent of them are engaged in the professions, technical occupations, and in managerial positions. Fourteen per cent are in clerical and sales work; 13 per cent in farming; 10 per cent in skilled mechanical jobs; and 25 per cent are engaged in manual work and service-type jobs.

One blind veteran is a concert singer, another is an author who has published a successful book, and is now working on a sequel. Then there is a free-lance magazine writer; a biweekly newspaper editor who also serves as a representative in the general assembly of his state.

Ten are teachers, one is a clergyman who also appears on radio, and still another is a biologist.

Several dozens of these men are operators of vending stands, ten of them are lawyers, one is a personnel director, and another is a plumbing and heating sales engineer. One of these blinded veterans operates a frozen foods department in a large supermarket, and another runs a small general store.

One of the blind men grinds lenses for cameras and gunsights. Another overhauls auto engines. Three others are cabinetmakers, and still another repairs bicycles. Three of the veterans repair radio and television sets, one is an electrician who can wire a house completely without assistance from anyone, four are loom operators, nine do photographic work in darkrooms, one binds rare books for writers, collectors, colleges, etc.

The findings of this study present a hopeful picture for so many of the students who are suffering with various eye troubles. The war-blinded veterans analyzed in the study mentioned in the foregoing were all sightless. If totally blind men can be trained to occupy successfully the many occupations mentioned above, our students troubled with poor sight need not lose hope.

WE TOO NEED ENGINEERS AND TECHNICIANS

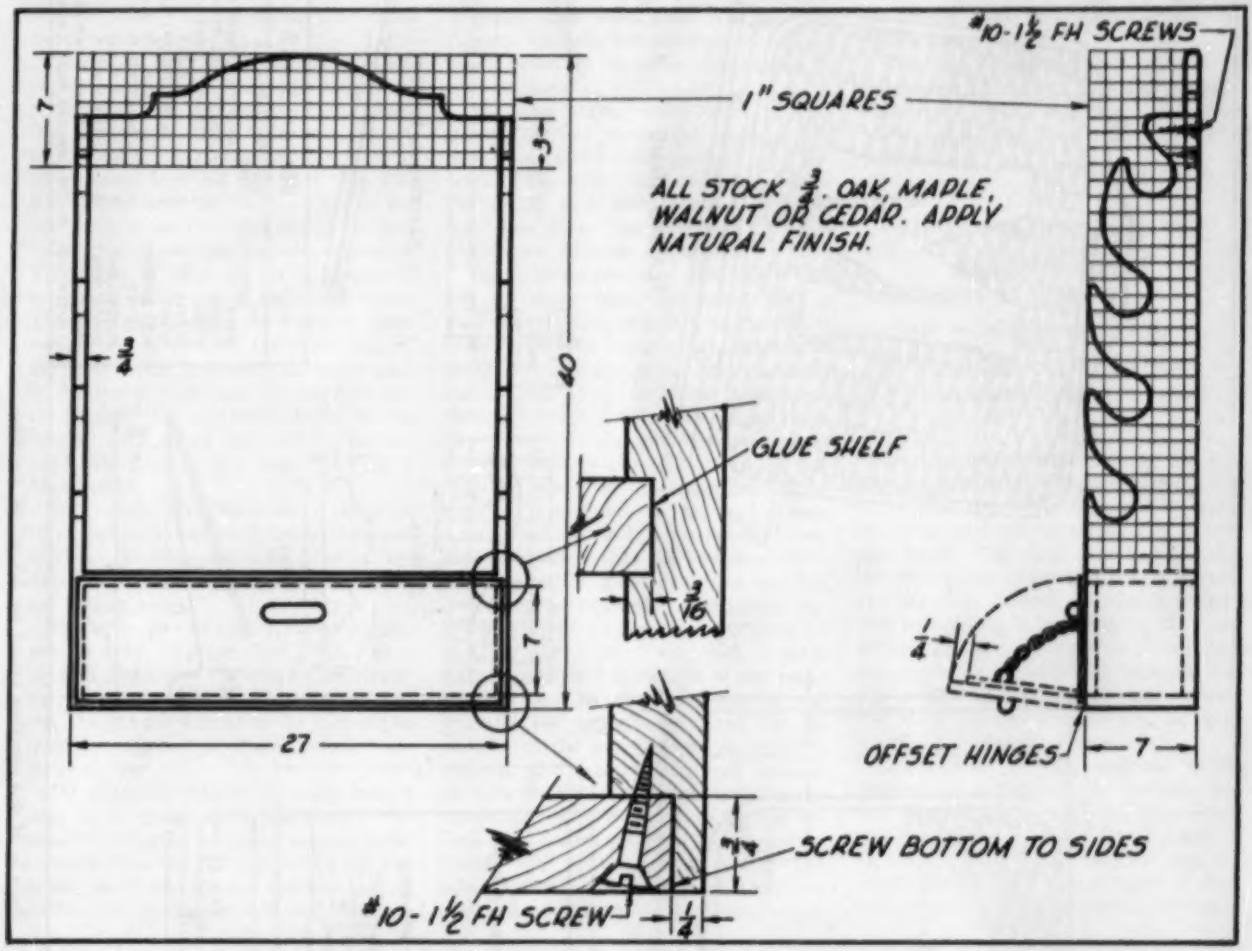
DR. LEON TRILLING, assistant professor of aeronautical engineering at the Massachusetts Institute of Technology, in his report on a study of Soviet education in aeronautics, states that the Soviets have trained a small but elite corps of aeronautical scientists who are second to none.

"These top scientists," Dr. Trilling says, "acting as a small flexible task force, have solved a number of theoretical questions . . . selected to keep Soviet aeronautical science abreast of any competitor. But," he continues, "the full cross section of engineers in the Soviet Union have apparently not yet acquired that degree of engineering 'feeling' which only broad familiarity with machinery can bring. They work by the book and require detailed direction. For this reason, excellent designs must frequently be adapted to inferior execution, and tooling or high-grade workmanship is reserved for only key parts of the assembly."

Since aeronautical engineering is of great importance to Russia it is natural that it should receive special, if not their best attention.

We in America must do our best to interest more of our high school students to enter college. It seems that we have followed a wrong course by allowing too many of our boys and girls to drop science and mathematics while in school. The result is that there are many now who have barely enough to satisfy entrance requirements to institutions of higher learning. The result is that we have not enough trained engineers and technicians and it behooves us to make strenuous efforts to orient promising students so that they may become skillful technicians and that there are sufficient applications for the many openings in the ranks of our engineering students.

Problems and Projects



Wall gun rack by Louis Barocci, Cudahy High School, Cudahy, Wis.

A USEFUL READING STAND

ALFRED W. LEIDTKE
Industrial Education Department
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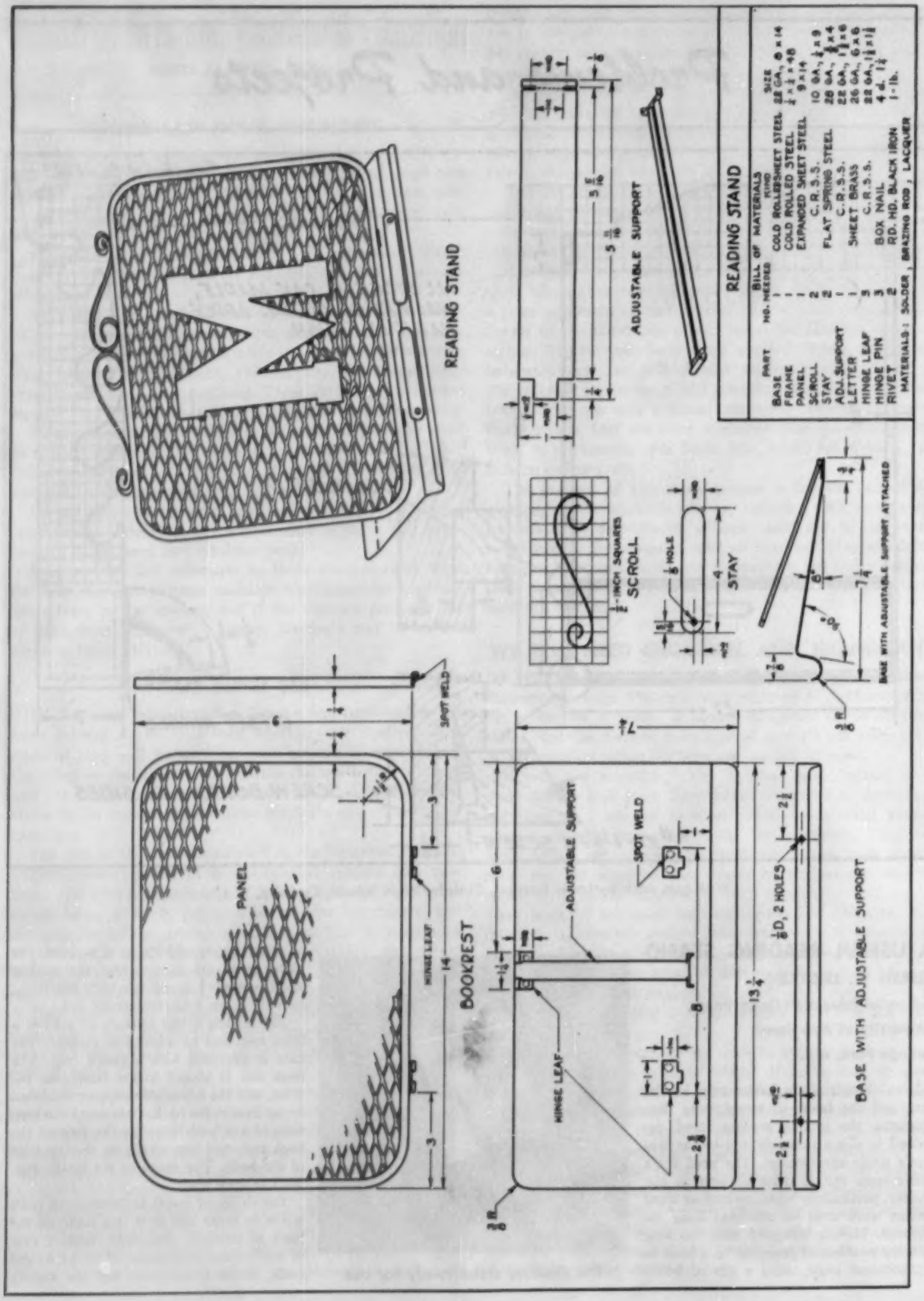
College Park, Md.

Even though study habits may be the best, and the hours of study more than adequate, the unique reading stand described in this article will add to the student's study effectiveness. The need for a stable book rest is quite obvious to any student, particularly when outlines or other written work must be extracted from the textbook. Having struggled only too long with the problem of propping up a book at a convenient angle, using a pile of books or other handy objects as a support, the writer is of the opinion that the reading stand presented herein is a very functional as well as an attractive study aid.

The reading stand ready for use

The reading stand consists of a base, a book rest, and an adjustable support. The base is provided with a pencil tray. The book rest is hinged to the base near the front, and the adjustable support is hinged to the base at the back. Ornamentation consists of a school letter on the face of the book rest, and two scrolls on the top edge of the body. The shape of the scrolls suggests an open book.

The choice of metal as the material from which to make this item was made on the basis of strength, durability, relative ease of fabrication, availability of materials and tools, design possibilities, and the variety



READING STAND

BILL OF MATERIALS

PART	NO. NEEDED	KIND	SIZE
BASE	1	COLD ROLLED SHEET STEEL	22 GA., 6 x 14
FRAME	1	COLD ROLLED STEEL	¼ x ½ x 48
PANEL	1	EXPANDED SHEET STEEL	9 x 14
SCROLL	2	C. R. S. S.	10 GA., ½ x 9
STAY	2	FLAT SPRING STEEL	28 GA., ¾ x 4
ADJ. SUPPORT	1	C. R. S. S.	22 GA., 1½ x 6
LETTER	1	SHEET BRASS	26 GA., 6 x 6
HINGE LEAF	3	C. R. S. S.	22 GA., 1½ x 1½
HINGE PIN	3	BOX NAIL	4 d., 1½
RIVET	2	RD. HD. BLACK IRON	1 - lb.

MATERIALS: SOLDER, BRAZING ROD, LACQUER

Details of the reading stand by Alfred W. Leidtke

of metalworking processes this project affords.

The base was cut from 22-gauge black, cold-rolled sheet steel. The corners were rounded to a 3/8-in. radius. The sharp bends were made with the sheet-metal brake. In order to form the pencil tray with a uniform curve of approximately 3/8-in. radius, the bar folder, instead of the sheet-metal brake was used.

The book rest, against which the book leans, consists of a frame, a panel, two scrolls, and a school letter or monogram. The frame is made of 1/4-in. square steel, bent to shape using a bending fork made of 3/8-in. round iron rod held in a vise. The bends were made so that the ends of the piece met at the center of one of the long sides. They were then butted and brazed. The panel is 18-gauge, 1/2-in. expanded metal, cut to fit snugly inside the frame. The panel is brazed to the frame at alternate points of contact, the front face of the panel being flush with the front edge of the frame. Care must be exercised not to overheat the expanded metal during brazing, since excess heat will further expand this material and may result in a *bowed* panel.

The scrolls were made from strips of 10-gauge black sheet steel, cut to the same width as the frame material. Bending was done with a bending fork made of 1/8-in. rod held in a vise.

The letter, in this case a block-style *M*, was cut from 26-gauge sheet brass with a 32-point scroll saw. The edges of the letter were filed smooth with a smooth-cut mill file. The letter is secured to the face of the panel by soldering at several points from the rear.

The adjustable support was made from a strip of 22-gauge black sheet steel. By using this material the entire support could be made from one piece, including the *engaging* tips at the top end and one half of the hinge at the bottom end. The shank of the support is given rigidity by *folding over* the long sides and butting the edges at the center, thus forming a rigid structural shape.

The book rest is fastened to the base with two hinges. The adjustable support is also hinged to the base. Hinges are simple flat hinges, the leaves being cut from 22-gauge black sheet steel. The pins are 4-penny box nails with heads cut off. Hinges are fastened to the other components by spot-welding.

The two stays, which serve as adjustable devices to prevent pages of the book from accidentally turning, were fastened to the vertical surface directly above the pencil tray with 1-lb., round-head, black iron rivets. The stays were cut from 5/8-in. wide, 28-gauge spring steel.

The finishing processes were fairly simple. All sharp edges and excess brazing material were filed smooth. The face of the brass letter was brought to a fine satin finish by rubbing with fine powdered pumice and water. The final finish consisted of spraying flat black lacquer over all ferrous parts, and spraying clear lacquer over the face of the brass letter. Before applying any spray, a certain amount of masking was done, as follows: Brown Kraft paper was cut to a size several inches wider and longer than the book rest. With the book rest lying flat, the paper was laid over it and an impression of the letter was taken by pressing upon the paper along all edges of the letter. Then, with a sharp knife, the letter was cut out of the paper in one piece to the exact size of the original. The letter cutout and the remainder of the paper served as masks in spraying the steel surfaces and then in spraying the letter. In the event that spray apparatus is not available, or its use not considered convenient, the lacquers may be applied with a large artist's brush. The latter method, if care and patience are exercised, should give results almost equal to the smooth, uniform finish to be obtained by spraying.

While a great deal of personal satisfaction can be derived from fabricating one of these reading stands for personal use, the item lends itself very well also to mass production, since the operations are relatively simple and the entire project can be broken down into clear-cut, unit operations.

The cost of the materials is estimated not to exceed $1.25. Actual time expended was about seven man-hours, the work being distributed over several work periods.

NEW PLASTICS IN THE SCHOOL SHOP

ALEXANDER F. BICK
Teacher in Milwaukee Schools
The Milwaukee Downer College
The Stout State College Summer Session

The illustrations accompanying this article show real shop situations. Tiles, trays, tables, and some very fine jewelry pieces are being produced by students of various age levels. The boys working on tiles are grade seven junior high school students and the chair builders are eighth graders. The two young ladies finishing the table are college seniors majoring in occupational therapy. Some exceptionally beautiful mosaic work was created by art students and their accomplishments will be illustrated in a subsequent article.

Industrial-art teachers may not be interested in embedding pig embryos but this work is shown here to demonstrate that even difficult projects can be mastered by students. The plastic manikin and the major internal organs were made of Castolite, Castoglas, and fiberglas. The three

Fig. 1. Eighth graders preparing a plaster mold for a fiberglas chair; (at right) Fig. 2. Impregnating fiberglas mat and fabric, formed over a chair mold, with Castoglas resin

Fig. 3. Junior high school students cutting fiberglas fabric and coating it with liquid resin to produce laminated sheets; (at right) Fig. 4. removing the room temperature cured laminated sheets from film and squaring edge

boys shown with the model can be justly proud of their work, as can their teacher, Gerald Ernst, of Archbold, Ohio. All the photographs amply demonstrate how these versatile liquid plastics are being successfully used at various grade levels and in many school departments.

Shop Organization Saves Teacher's Time

Shop men who have never done this work before find it difficult to believe that most of the pieces shown were made with little teacher guidance. It is a matter of organization. A student chairman is appointed who in turn delegates various responsibilities to other boys. With the aid of clear-cut, illustrated directions, they quickly learn the few basic principles of casting and laminating. It's a new and exciting experience for most students and few teachers fail to share the keen and

Fig. 5. These boys are cutting plywood sections for tile work

Fig. 6. Colored Castoglas is poured over individual wood sections and these are cemented to a wood top; (at right) Fig. 7. College girls pouring a tough, hard-wearing surface on a coffee table with multicolored liquid-Castoglas

Fig. 8. Agricultural students embedding weed seeds in clear Castolite

spontaneous enthusiasm of the boys. Thus, by assigning the introductory experimental work to the students, the teacher saves valuable hours. At the same time, the boys learn the principle and the value of organizing a program in a practical way. Most of them are ready and willing to assume responsibility when they have an opportunity to work with new materials with which they can produce exceptional projects in a short time.

Liquid Plastics Easily Adapted to Existing Wood and Metal Shop Curriculum

The use of new materials and new methods such as are described here are inevitable in industrial arts shops. There will be minor obstacles, of course, not the least of which is a natural human tendency to follow the accustomed course. There was a time, as some of us can remember, when only woodworking was being taught. The same human inertia had to be overcome to get metalworking, machine shop, electricity, and printing, accepted. Now the chemical industry has developed synthetics that have pervaded every industry and every home. On every hand we see conventional materials beautifully combined with synthetics. For this reason, plus the fact that no expensive tools or equipment are needed, the introduction of liquid plastics into shop programs has been more readily accepted than was the case with metals. In previous articles of this series, the factors emphasized that Castolite resins fit best into the wood or metal shop courses and that it is not necessary to start a special plastics course. Because the resins and fiber glass materials are used for so many applications, there is no need to confine them even to wood and metal shops. Use them in any existing course — machine shop, electrical, auto, welding, farm, even the fine arts department.

Fig. 9. Three bright eighth graders proudly display their plastic manikin. One of the boys also served as model for the torso

Students Learn Compounding of Resins

All students above the sixth grade, as the illustrations prove, can readily learn the basic principle of using Castolite resins. His new chemical experience is expanded as he learns to compound variations of basic formulas. For different projects, he may need resins of varying viscosity which he achieves by adding thinners or fillers. To impregnate a heavy Fiberglas mat, for example, he may thin the resin for better penetration. To make a paste suitable for decorative relief work or sculpturing, he adds Castosil, a fine white powder. For repairing a metal pipe, ground glass fiber is mixed with the resin to obtain a steel-hard compound. Pigments and dyes enable him to create endless color combinations from bright reds and yellows to black and white or just battleship gray. Fluorescent and phosphorescent pigments and a series of metallic resin powders further enhance his creative opportunity in developing an endless variety of unusual projects.

Fig. 11. Professor Hessland of the University of Stockholm, Sweden, explaining Castolite embedding principles
— Photograph, courtesy of Peddy-Foto, Stockholm, Sweden

Synthetics Are Here to Stay

From the foregoing, it is obvious that

Fig. 10. Senior high school student embedding biological specimen

the student activity is not confined to just a few simple fabricating techniques. He is learning the basic fundamentals of processing new raw materials. And let there be no doubt about it, these modern synthetics are here to stay. They are expanding at a fantastic rate that even the optimistic and dynamic plastics industry itself has not dared to predict. Remember that these chemicals are not necessarily substitutes for metal, wood, leather, glass, and other conventional materials. They compete with them and replace them where they can be used to better advantage cost-wise or because they have certain inherent advantages such as resistance to corrosion, high strength, low weight ratio, or for a host of other reasons.

No Heat and No Pressure Required

You will appreciate the tremendous impact of these new chemical materials upon nearly every industrial activity when you consider that you can mix your own resin alloys and fabricate them in your own wood or metal shop. Imagine casting and forming resins that look like glass, or aluminum, or enameled copper and that are lightweight yet nearly unbreakable. Picture yourself being able to produce such products as bowls, dishes, table tops, yes, and entire boat hulls or automobile bodies all in one-piece units. And further imagine that you can do all this with only hand or small power tools and require neither heat nor pressure. You can create professionally finished projects in less than an hour right from the raw material. Are you impressed with the tremendous possibilities and the endless opportunities of these synthetics? The top-flight designers in the auto and aircraft industry are! They use tons and tons of these structural materials for model and pattern work, for dies and jigs, and for special parts that are too expensive and too slow to make with conventional materials.

Versatility of Liquid Plastics

Each group of synthetics has its own unique properties which make them valuable for specific applications. Few of them, however, possess the almost unbelievable versatility of Castolite resins, and it is this very feature that makes them so valuable for the school shop. This in fact, is the reason why the writer has concentrated on this particular family of resins for a number of years. They lend themselves so admirably to teaching the basic fundamentals of synthetics, including those requiring a somewhat different technique.

When the perennially busy teacher fully realizes the importance of liquid plastics in industry and their many uses in the school shop, he will find the time to introduce them — and that the time for this is right now. Once a beginning is made, shop organization and a basic procedure prepared by teachers is his assurance that the program will progress on its own momentum.

Scale model of the industrial-arts department at DuQuoin Township High School. The layout and models of machines and equipment were made by Lester Norris, assisted by John Wright, Billie Wright, Dolores Merkle, Maurice Porter, John Milan, and Lyman Eaton.

Lester Norris is shown at the left, and Frank Dohanich, instructor, at the right. J. Wesley Neville, also an instructor in the department, assisted.

Submitted by Frank Dohanich, Frankfort Community High School, West Frankfort, Ill.

PLANTER'S LAMP

HAROLD V. JOHNSON
Senior High School
Canton, Ill.

A planter's lamp makes an interesting project in metal spinning. The spinning is not too difficult and a variety of metals can be used in this project. The lamp can be made from aluminum, brass, or copper. Aluminum is the easiest to spin, but brass or copper, when polished, makes a very attractive lamp.

Copper or brass has a tendency to harden during the spinning process. When this occurs remove the metal from the chuck and anneal. Annealing is done by heating the metal and plunging it into cold water.

Procedure

1. Construct two chucks of hardwood. One for the bowl and the other for the base. These blocks are turned to the desired shape and size from hardwood such as maple, walnut, or cherry. Some examples of wood chucks are shown in Figure 1.

2. Turn a follow block for each chuck slightly smaller than the diameter of the base.

Fig. 1. Spinning chucks

3. Mount the chuck on the headstock spindle and place a spinning center in the tailstock. See Fig. 2.

4. Insert the disk between the chuck and the follow block.

5. Tighten up on the follow block so that the disk is held firmly against the chuck as in Figure 2.

6. Mount the spinning rest in the rest holder with fulcrum pins in place.

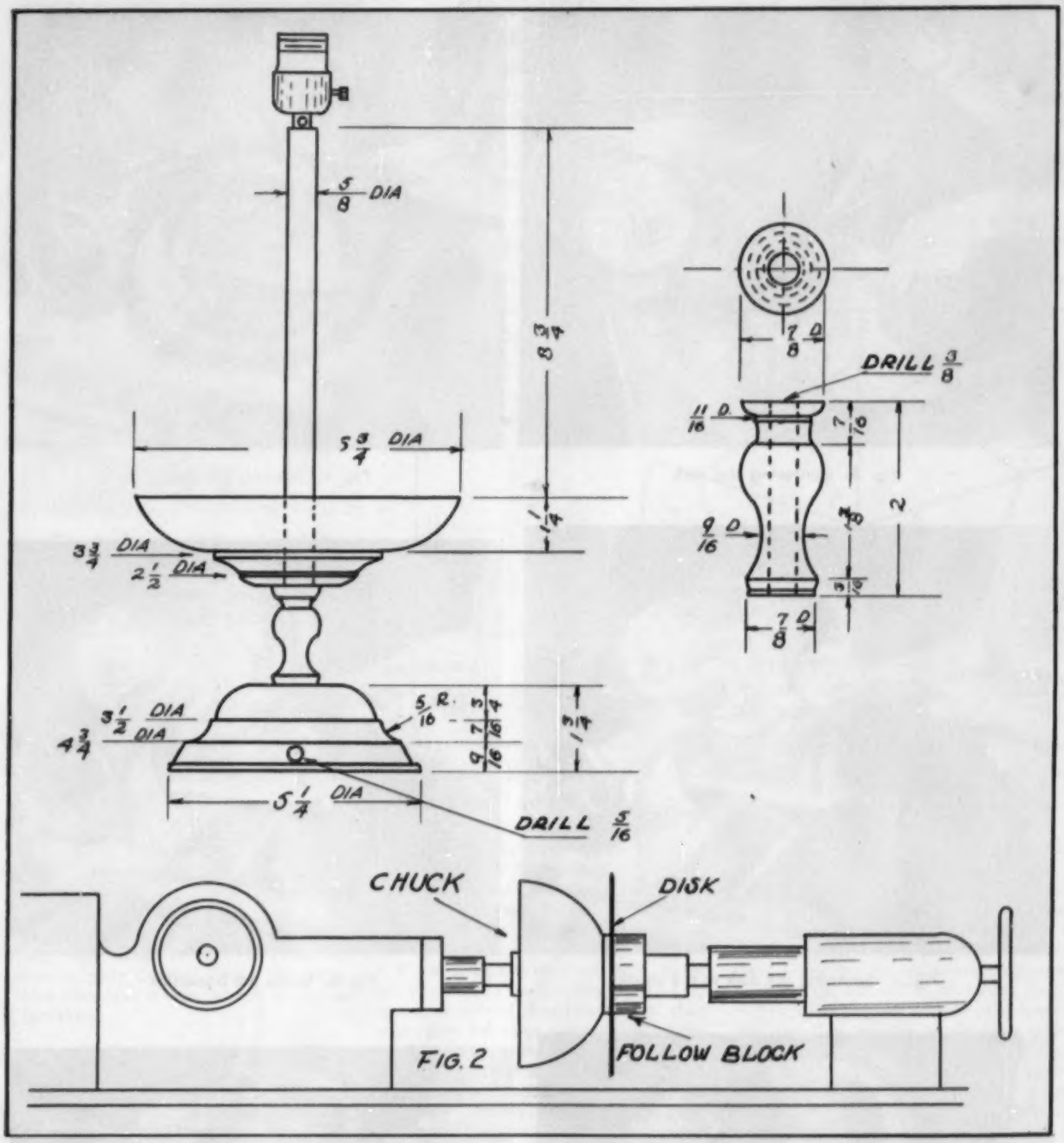


Fig. 2. Details and setup for the spun planter

7. Start the lathe at a slow speed and with a flat piece of hardwood press lightly on the edge of the disk loosening the tailstock slightly at the same time. Do not stand in line with the disk as the metal might fly from the lathe before being seated (Figure 3).

8. Lubricate the blank with yellow laundry soap, tallow, or a commercial lubricant.

9. With the spinning tool held under the right arm and supported on the rest against the fulcrum pin, seat the disk against the chuck with a single stroke of the tool to the left (Figure 4).

10. Work the tool back and forth in a short radius. Keep the tool moving and try to avoid holding the tool in one spot (Figure 5). Too much pressure in one spot will cause the metal to thin out and rupture.

11. The disk will have a tendency to wrinkle. This is caused by changing the form too rapidly. Wrinkling can be avoided by the proper use of the backstick as shown in Figure 6.

12. If the disk wrinkles place another fulcrum pin in the rest and with the backstick apply pressure against the spinning tool.

13. Before the last half inch of metal is laid down to the chuck, turn the disk to size with the diamond point tool as in Figure 7. The tool rest should be moved as close as possible to the disk.

14. If a bead is desired around the edge

Fig. 3. Centering the disk

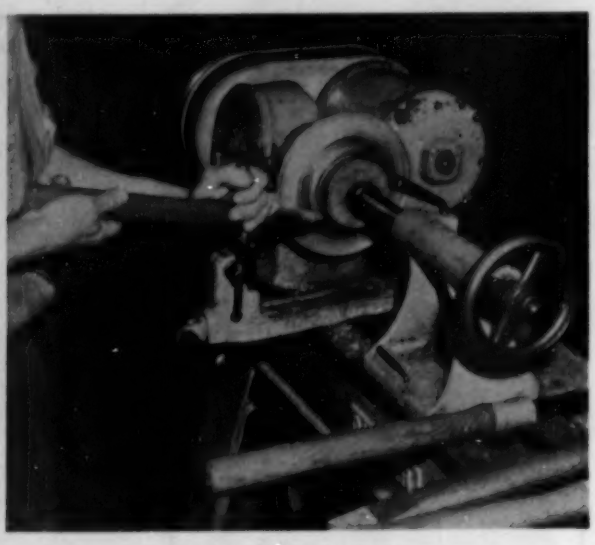


Fig. 4. Seating the disk

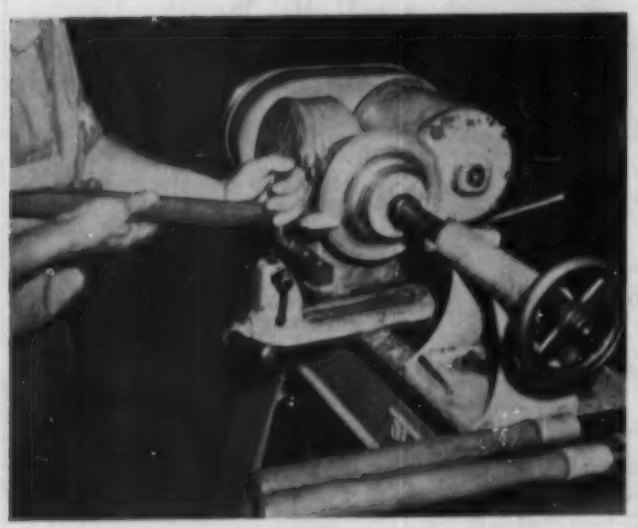


Fig. 5. Spinning the disk to the chuck

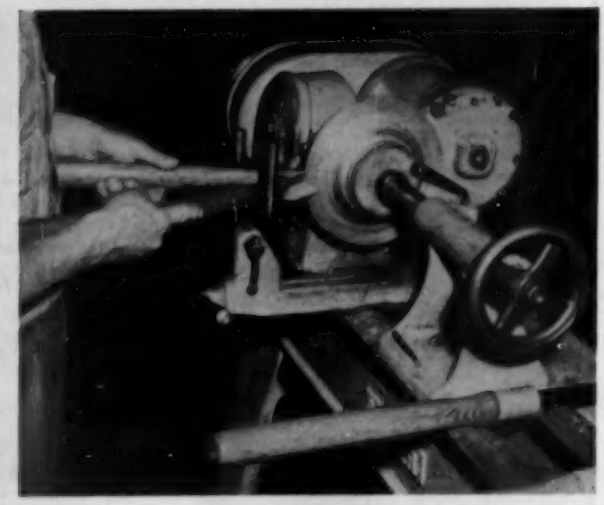


Fig. 6. Using the backstick

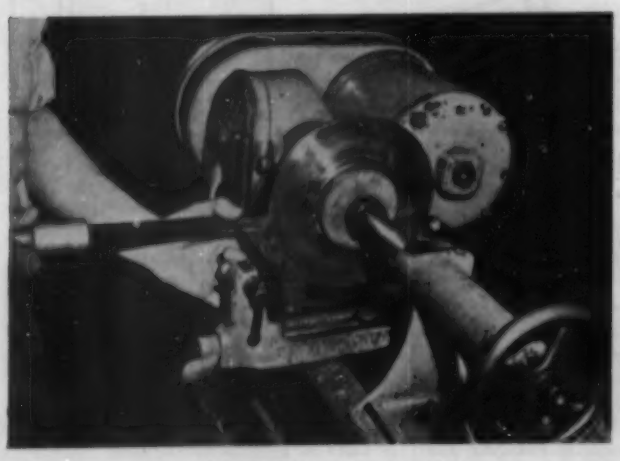


Fig. 7. Trimming the edge

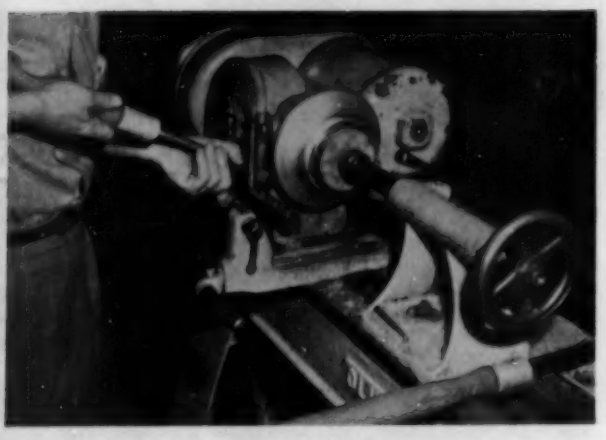


Fig. 8. Beading the edge

Fig. 9. Planter lamp completed

of the bowl, a beading tool may be used as shown in Figure 8.

15. Spin the base in the same manner.

16. After spinning these two parts they can be polished while they are on the chuck with fine emery cloth and steel wool or they may be removed and polished and buffed on a polishing wheel.

17. Turn the stem on a metal cutting lathe as per dimensions.

18. Drill a 3/8-in. hole through the stem to receive the cord.

19. Polish.

20. Make the shade support from a piece of 5/8-in. brass tubing 8 3/4 in. in length.

21. Assemble the various parts of the lamp. A piece of 1/4-in. pipe threaded on both ends should be used to fasten the various parts together. Spray the assembled parts with a clear lacquer to prevent tarnishing.

Hints on Metal Spinning

Johnson's No. 140 Stik-wax is a very good lubricant to use on copper, aluminum, pewter, etc. For the harder grades of metal, naphtha soap is a good lubricant. While spinning make sure that the blank is kept well lubricated otherwise the tool will stick to the surface of the metal and tear the metal.

To prevent wrinkles carry the spinning tool all the way to the edge and back. Learn to use the backstick as it is a very important tool to successful spinning.

A tool made out of a pick handle is the best for spinning aluminum and pewter.

A deep spun project has to be trimmed frequently to avoid cracks forming in the edge of the metal.

GENERAL SHOP DIAL CLEANUP CHART

KENT E. JOHNS
General Shop Instructor
Mesick Consolidated Schools
Mesick, Mich.

Being in a one shop teacher situation can be very upsetting when it comes to cleanup time at the end of each class period.

At the beginning of this school year, I started off having a foreman in charge of cleanup but it did not accomplish what it was meant to do. So I started looking for different ideas on cleanup. I ran across many new ideas but none would fill the bill for my general shop cleanup.

If you don't find what you want, you've got to create. Therefore, here is my creation on a general shop cleanup dial chart with space for notes and bulletins of importance to the class.

Using a sheet of Masonite, 23 by 35 in., I painted a red circle on the right side of the board, 23 in. in diameter, for the background. On the left side was painted a green rectangular section, 12 by 23 in., for bulletins of the day.

In our shop there are 5 different areas. Therefore, we cut a circle from masonite, 13 in. in diameter, and then make a polygon from it on which the 5 sides correspond to each area. This polygon is then painted white.

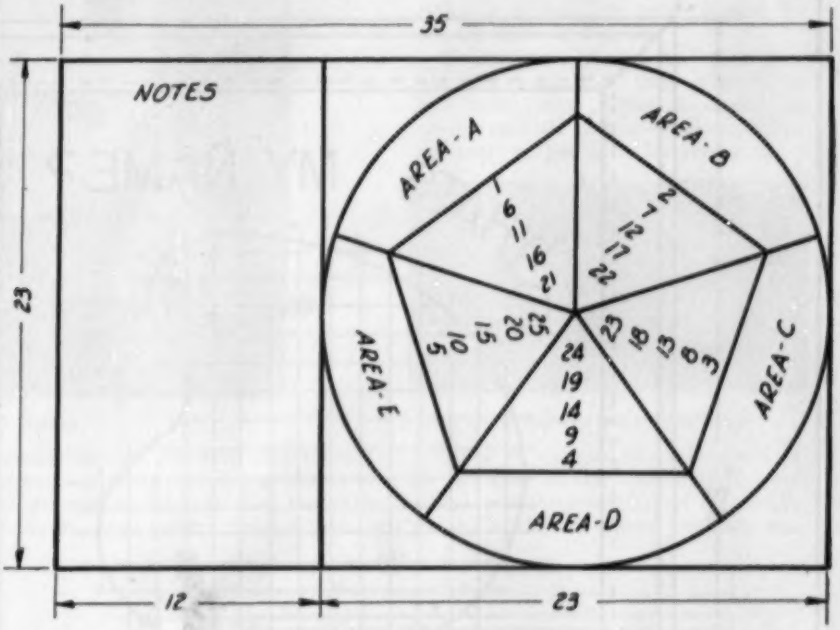
Next, the polygon and the red background circle are divided into five corresponding sections by black lines approximately 5/16 in. wide and radiating from the center of the polygon.

A hole is then drilled through the center of the polygon and through the center of the red background circle to receive the bolt on which the polygon rotates.

Number each division consecutively, 1 through 25, in the polygon. Then assign like numbers to the students. They are to retain these numbers throughout the school year.

The smallest numbers are to be placed on the outside and the larger ones toward the center.

Assign a letter of the alphabet, preferably A through E, to each shop area and place one of these letters into one of the sections of the red background.



General shop clean-up dial

By rotating the polygon, the new assignments to the various areas may be made from day to day.

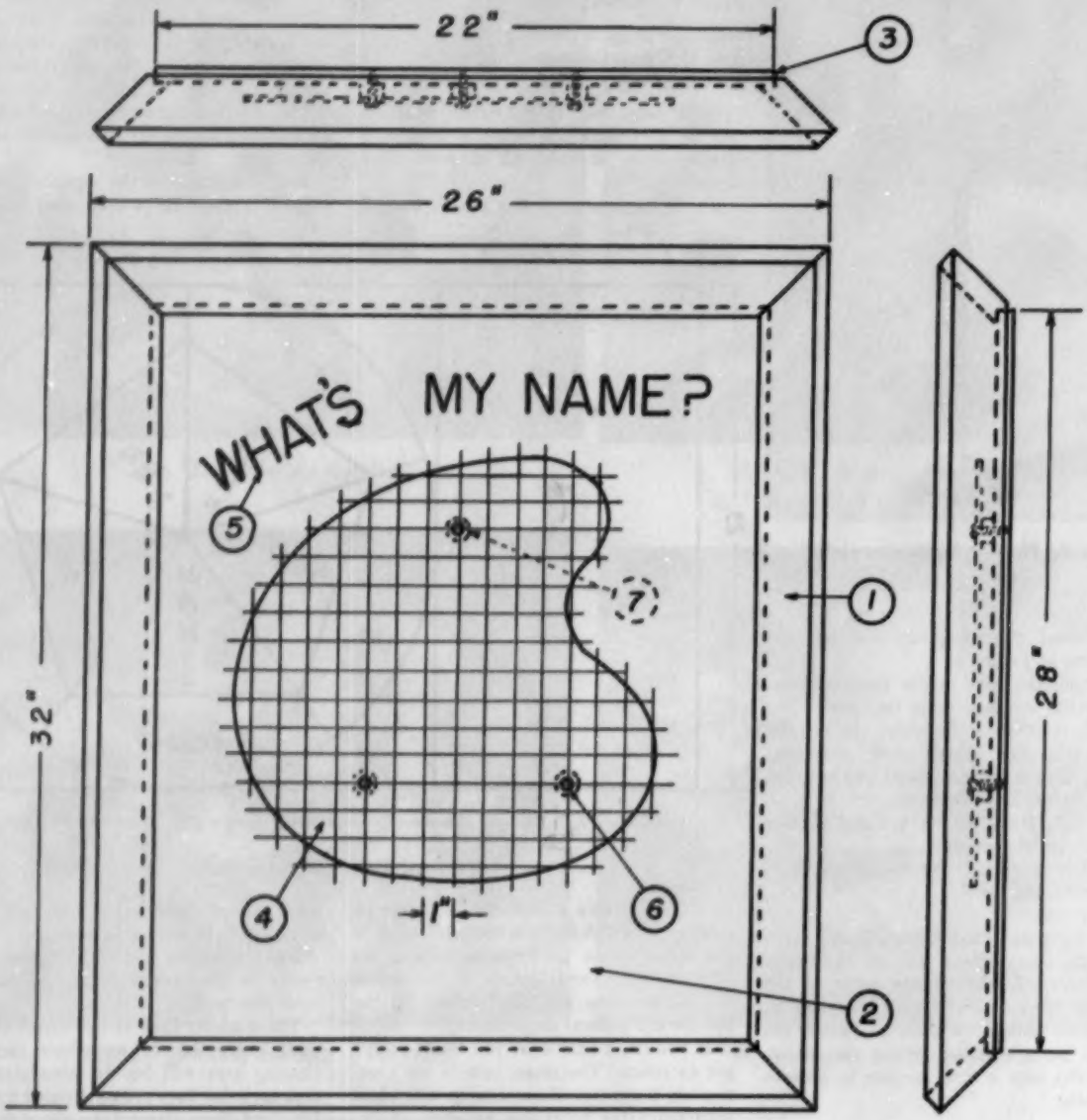
The students look at this board the first thing every day to see where their new cleanup area will be. It stimulates them that each day they are confronted by a new job, and they attempt to clean up their area better than the other students who have the responsibility to clean up the other shop areas. I find also that all areas are cleaned up where before only the messiest ones were cleaned.

A diagram may be posted on the bulletin board showing where each of the different areas is located. These areas could also be designated by different colored lines painted on the floor.

A FEATURE DISPLAY FRAME

RAYMOND B. COLE
Crafts Instructor
High School
El Monte, Calif.

The industrial-arts teacher has a dual responsibility in teaching shop students. He is charged with instructing in the manipulative

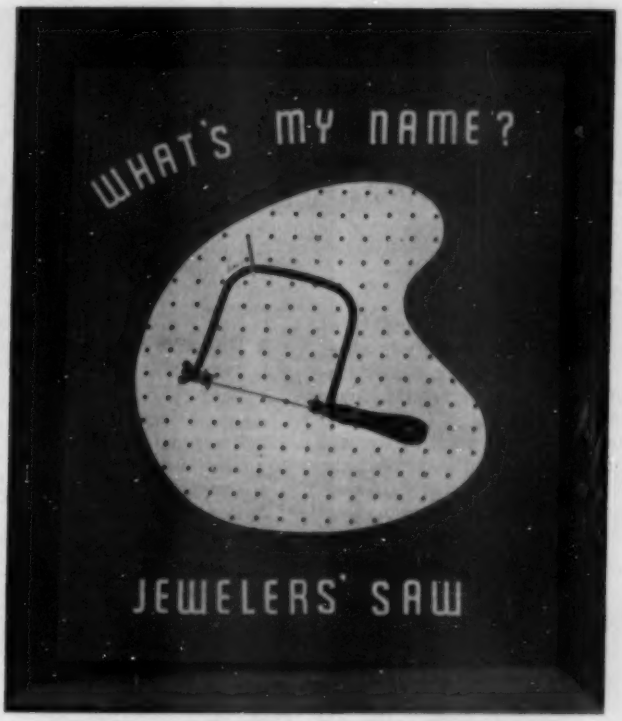


FEATURE FRAME

R.B. COLE — EL MONTE H.S.

REF.	NO.	NAME	DESCRIPTION
1	1	FRAME	22"x28" SHADOW BOX
2	1	CORKBOARD	1/4"x22"x28"
3	1	PLYWOOD	1/4"x22"x28"
4	1	FREE FORM	1/8"x15"x15" PEGBOARD
5	FONT	LETTERS	1-1/2" PIN-BACK DISPLAY
6	3	SCREWS	1" NO.8 - R.H.B.
7	3	SPACERS	1/8" PIPE - 3/8" LENGTH

Details and list of materials of the feature frame



The feature frame

skills and also in related information.

The feature frame is a unique and interesting method of presenting tools and materials. It helps to teach proper shop terminology and eliminate such terms as *gismo, deal, thing,* etc. It provides an excellent opening for presenting related information from various research units on individual tools, materials, and processes.

It may be used for a *project of the week* display which is strong motivation for students to improve their work.

To make the feature frame most effective it should be placed prominently with special lighting.

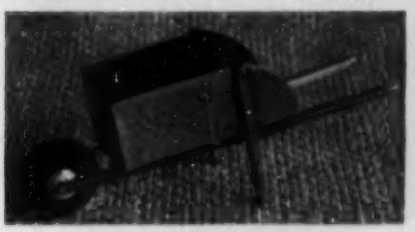
MINIATURE WHEELBARROW

CARL H. HUBACHEK

East Haven, Conn.

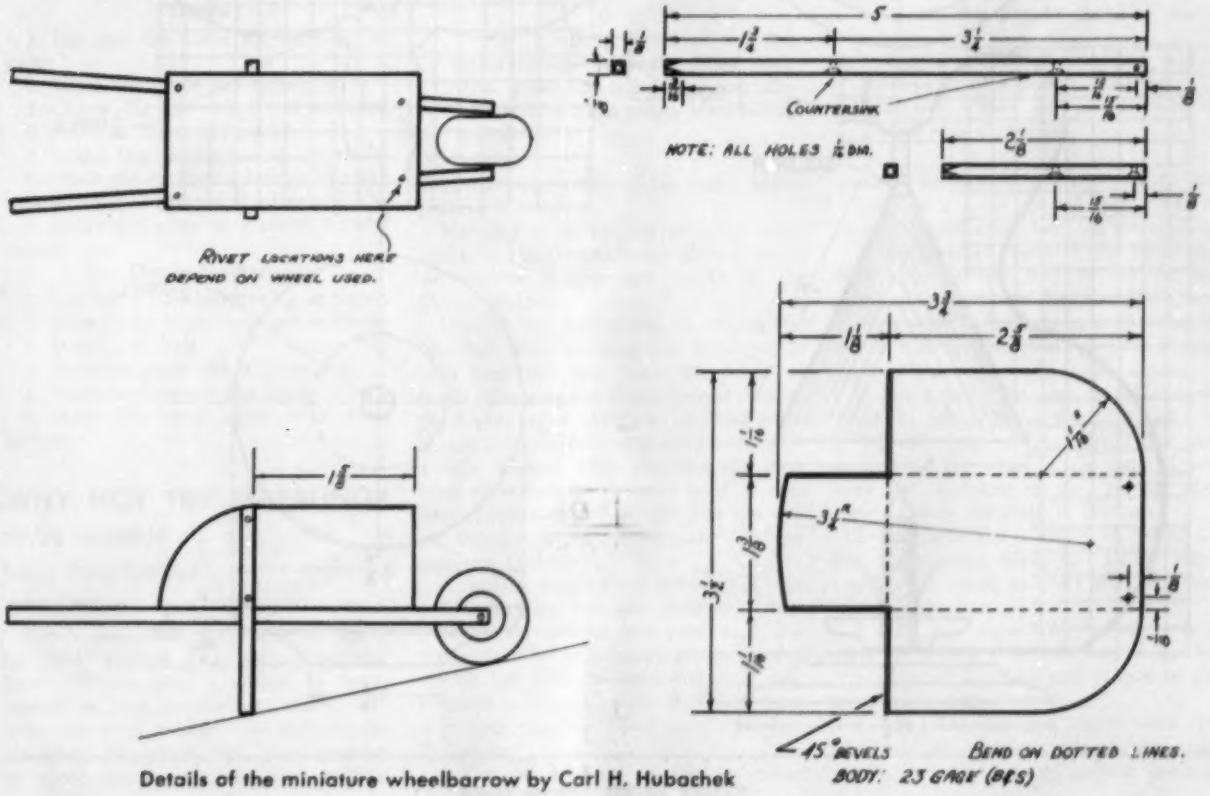
Of all the different projects one can make in a shop, the most popular by far are those that *work*.

The miniature wheelbarrow shown here not only works, but those who see it can hardly resist rolling it around. It can be used for holding cigarettes, as an ash tray, or just as a knickknack.



Mininature wheelbarrow

Choice of materials will vary according to the taste of the individual and, of course, with the availability of the various metals. In the one shown, the body was



Details of the miniature wheelbarrow by Carl H. Hubachek

made of copper and the legs and handles of brass.

The wheel is a model airplane wheel approximately one inch in diameter with an aluminum hub.

The handles and legs can be soldered or riveted to the body. Brass escutcheon pins, No. 17 by ¼ in. long, make good rivets for this type of work. The point of the pin should be cut off and the pin cut to the correct length. For the best results a rivet should protrude from the work a length equal to one and one third times the diameter of the rivet shank.

If the handles are riveted, the holes in the body near the wheel should be put in last, to allow for adjustment of the handles according to the thickness of the wheel used.

The hole for the axel should be drilled after the handles have been fastened to the body. The axel should be made of steel or brass wire, 1/16 in. in dia. Brazing rod will work well.

Instead of bringing the body of the wheelbarrow to a high polish, it may be antiqued using liver of sulphur solution.

METAL CANDLE LAMP

HAROLD V. JOHNSON

Senior High School

Canton, Ill.

This project makes use of a variety of operations. Most teachers of metalworking find that a project which has a combination of hand work and machine work makes a very desirable project.

This candle lamp was made of wrought iron and brass and when completed the contrast between these two materials made a very pleasing and striking appearance.

Procedure

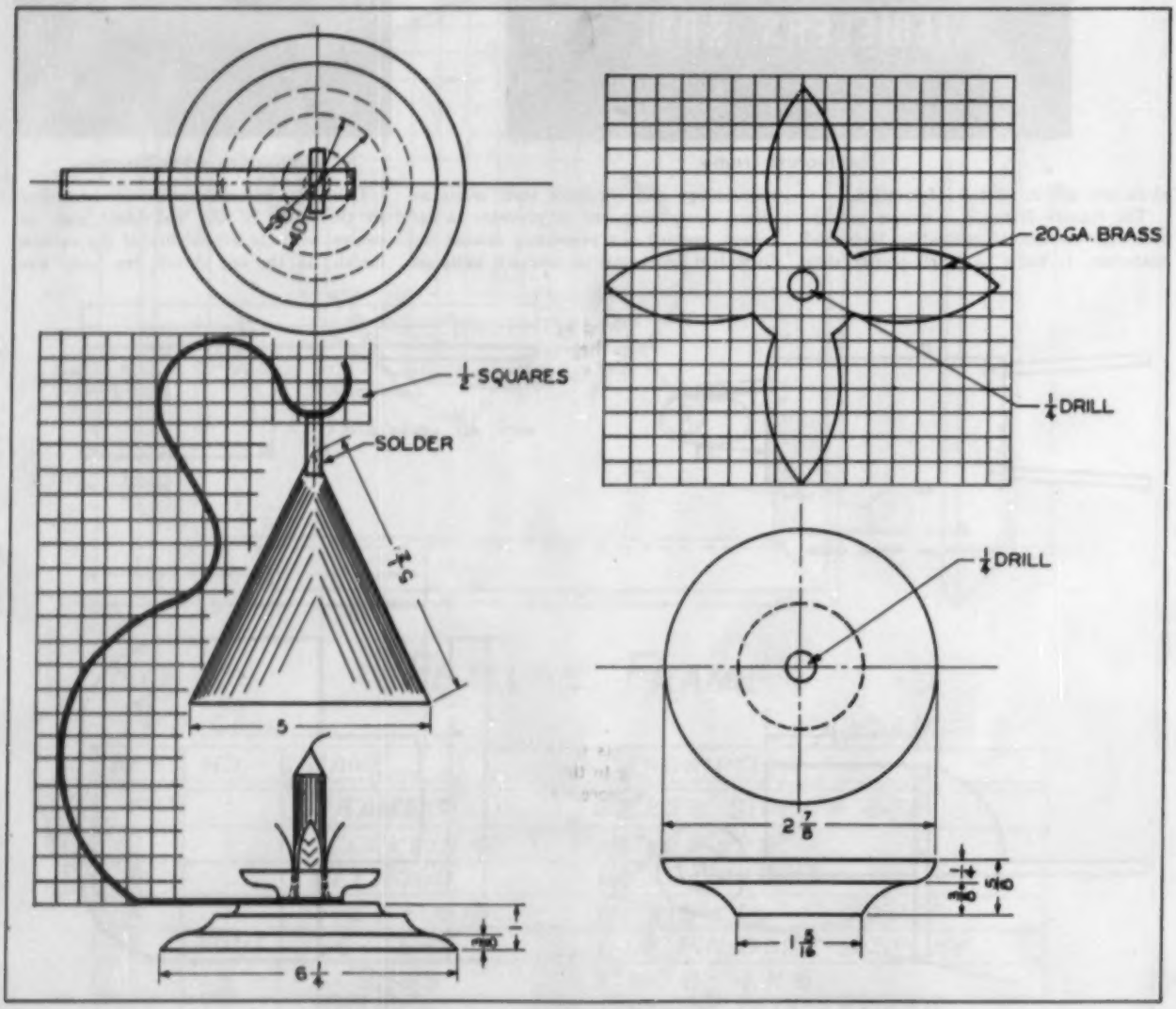
1. Construct the chuck from hardwood for spinning the base.
2. Turn a follow block slightly under 3 in. in diameter to fit the base of the chuck.
3. Place disk between the chuck and follow block and spin to the chuck.
4. Polish while the piece is in the lathe.
5. Drill a ¼-in. hole in the base.

Candle Cup

1. Spin the candle cup as per drawing.
2. Drill a ¼-in. hole in the center.
3. Polish and buff.

Candleholder

1. Trace outline of the leaf on 18- or 20-gauge brass.
2. Cut out with a pair of snips.
3. Bend to shape.



Details of the candle lamp

The completed candle lamp

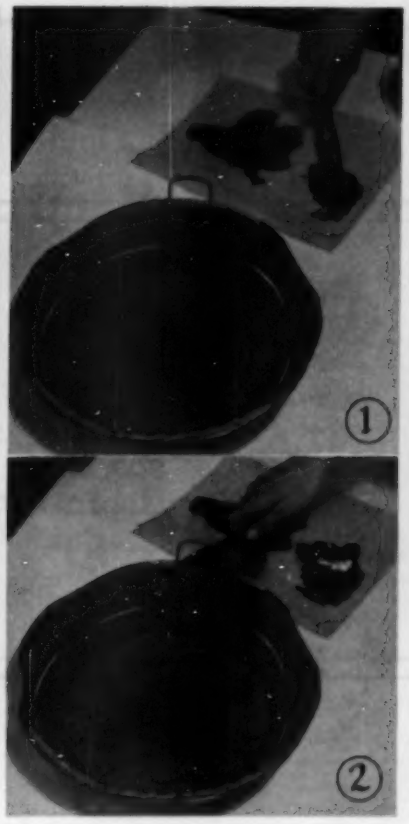


Fig. 1. Mix ink on a piece of tympan paper

Fig. 2. Drop some of the ink mixture into the water filled pan. The mixture will float on the water and form many interesting patterns

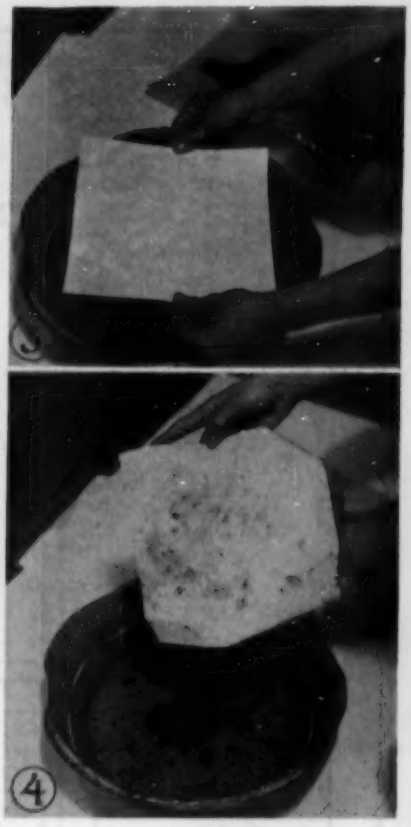


Fig. 3. Lay the printing paper on the water gently, making sure all the paper contacts the water

Fig. 4. The ink mixture will adhere to the paper creating a marbled sheet of paper with interesting patterns

Shade

1. Lay out the shape of the cone on paper.
2. Trace outline on the metal.
3. Cut to the line with a pair of snips.
4. Form to shape and solder.
5. Solder ring to the top of the shade.
6. Shade can be given a hammered effect with a ball-peen hammer if so desired.
7. Polish and spray or brush with metal lacquer.

Shade Holder

1. Lay out a full size drawing on paper.
2. Bend ⅛ by ⅝-in. band iron to shape.
3. Drill ¼-in. hole.
4. Assemble parts with a ¼-in. bolt.
5. Paint band iron a flat black.
6. Spray all brass parts with clear lacquer.

WHY NOT TRY MARBLING?

IRVIN LATHROP

Iowa State College

Ames, Iowa

Here's something different and useful for that graphic arts class — marbling paper. If you have a project of bookbinding in your graphic arts course here is a way each student can individualize his book. To make that play program or dance favor something just a little different — try marbling the paper before printing.

Marbling is an old art probably originating in the Orient. From there it found its way to Europe and finally to the United States.

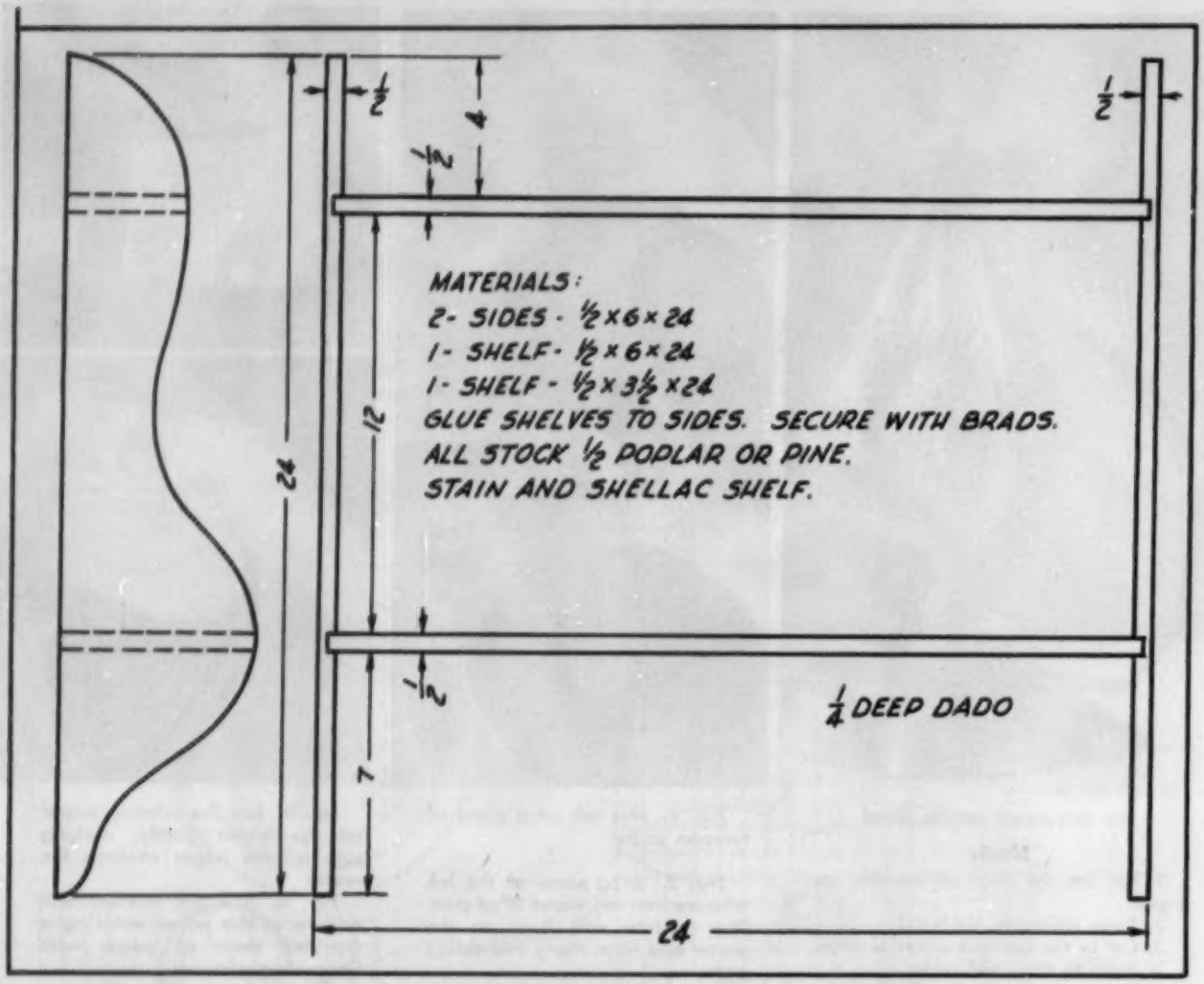
Uses of this unique art are varied and practical. Edge marbling was developed to help keep the dust from the inside of books. Marbling end sheets helped identify the owner of a book. (a use for which it is still employed), by making each book a little different. Edge marbling and marbling of end sheets makes a book decorative and pleasing to the eye. You can also use this simple process for making unique program covers.

Materials: Single sheet marbling is easy and interesting for the students. Other than an old dishpan you need very few materials. The only other things needed are an ink knife, various colors of ink, kerosene or turpentine and something such as tympan paper on which to mix the ink.

Procedure

1. Cut off a piece of tympan paper about 18 in. long on which to mix the ink.
2. Place a small dab of each color to be used in different places on the tympan.
3. Mix enough kerosene or turpentine with the ink to make it run off the ink knife. When mixing the ink, clean the ink knife after mixing each color to avoid mizing the colors before placing them in the pan.
4. Fill a large flat pan or old dishpan about ⅔ full of water from the tap.
5. Take some of the mixed ink and drop it on the water in the pan. If you wish the marbling to be colored, drop some of each color ink in the pan.
6. *Carefully* lay a piece of paper on top of the water. Make sure all the paper touches the water or there will be places with no design.
7. Lift the paper off the water and allow it to dry. You now have a distinctive piece of marbling that cannot be exactly duplicated.

Swirling the ink and water with the ink knife or combing with an old comb produces distinctive and artistic designs.



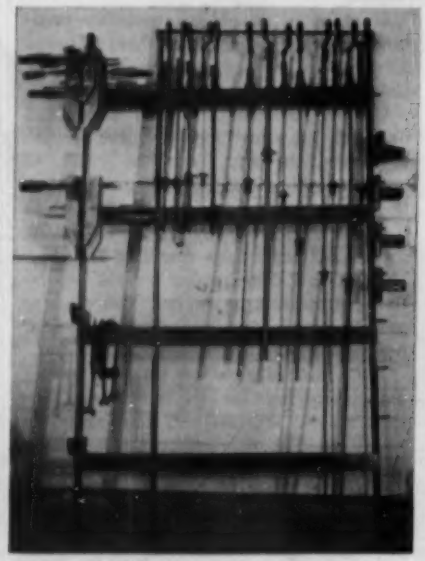
A wall shelf by George V. Cardinale, woodworking instructor, Roosevelt Junior High School, Erie, Pa.

CLAMP RACK AND STAND

GEORGE V. CARDINALE
Roosevelt Junior High School
Erie, Pa.

The clamp rack shown here requires very little floor space and provides storage for approximately fourteen bar clamps, twenty hand screws, and over a dozen *C* clamps. It fits neatly into a corner against a wall and can usually be placed in an area where other equipment may not be placed. It requires less space than most storage cabinets.

The clamp rack is constructed with materials commonly found in the woodworking shop, and is built entirely of stock which is ¾ in. in thickness and is assembled with wood screws. It is anchored to the floor with either stop blocks which are fastened to the floor or with wood screws installed through the foot of each upright into the floor. This arrangement prevents the rack from slipping to the floor. If possible the rack should be located near the glue bench.



The clamp rack

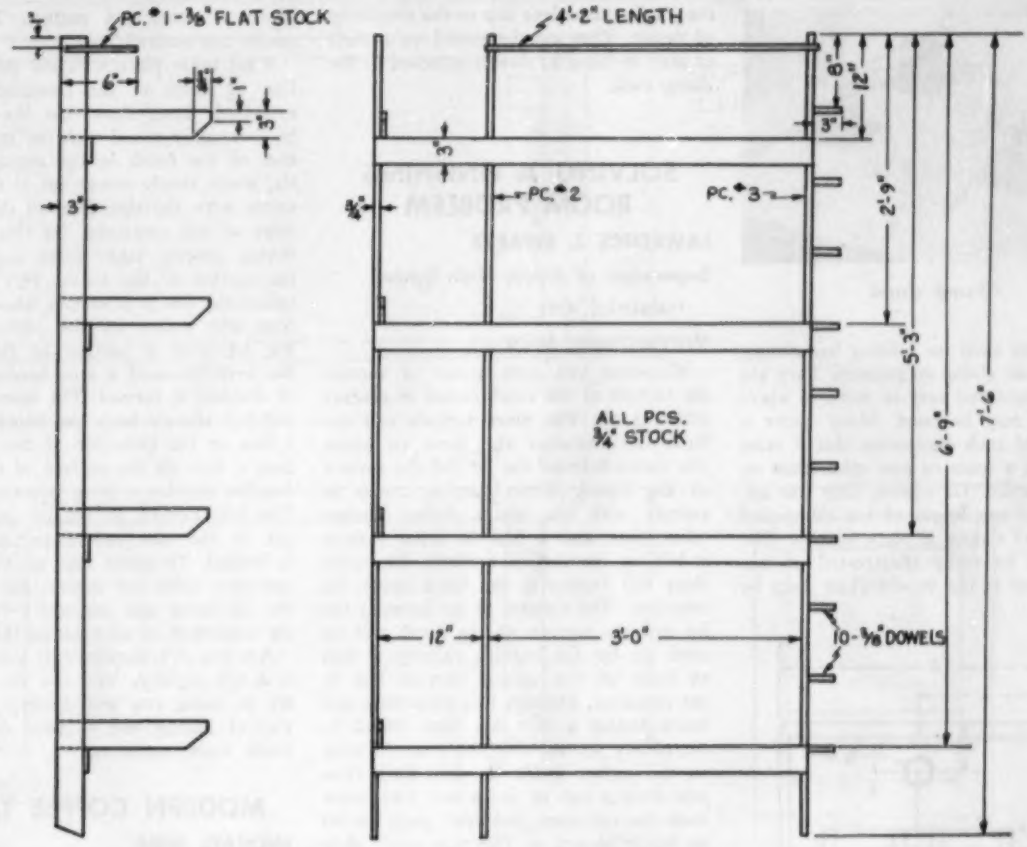
The metal strip (piece No. 1) is attached to the uprights (pieces No. 2 and 3) with No. 10 by 1 in. r.h. wood screws. This strip prevents the handles of the bar clamps from becoming entangled and causing clamps to fall off the rack while others are being removed. The strip (⅜ by 4 ft. 2 in.) eliminates this danger.

This clamp rack was built in our woodworking shop by a group of eighth and ninth grade pupils. It has been used for quite some time and has served well. Bar clamps are readily placed on the rack by junior high school pupils, and hand screws and *C* clamps may be placed on the rack easily and quickly.

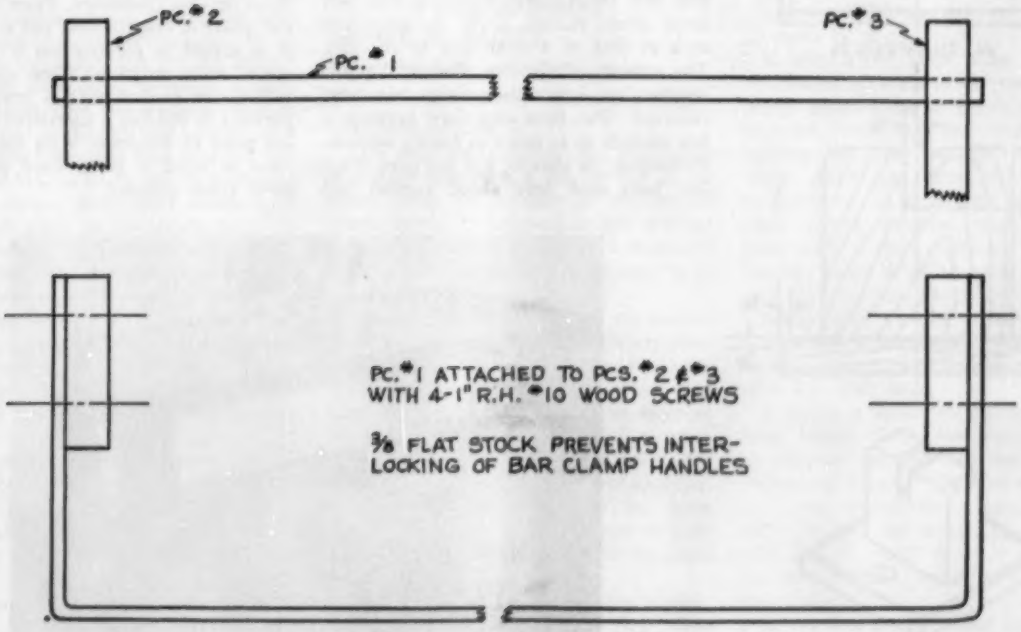
The ⅜-in. dowels which are fastened into piece No. 3 provide a place where the clamp stands may be hung when not in use.

Bar Clamp Stands

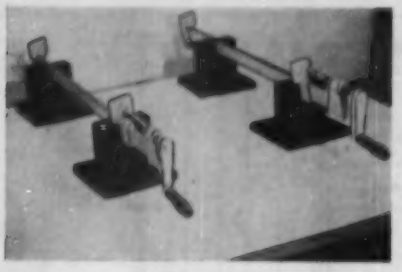
The bar clamp stand was built in our



Detail drawing of the clamp rack

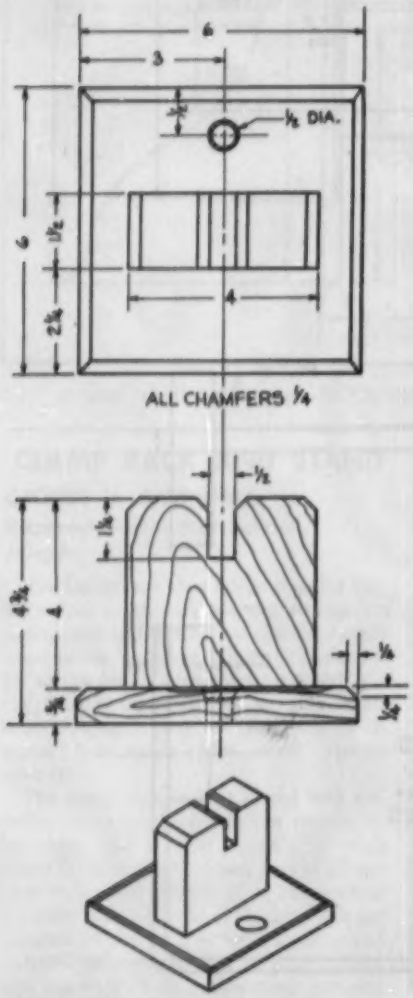


DETAIL OF PC.#1



Clamp stand

woodworking shop for holding bar clamps in place while gluing up projects. They are light in weight and easy to move to wherever they may be used. Many times a project is of such dimensions that it must be glued in a room or area other than on the glue bench. Of course, they are adjustable for any length of bar clamp and can hold bar clamps in place securely. The stand may be easily constructed of materials found in the woodworking shop by the pupils themselves due to the simplicity of design. They can be stored on a shelf or may be hung on dowels attached to the clamp rack.



Details of the bar clamp stand

SOLVING A FINISHING ROOM PROBLEM

LAWRENCE J. SWARTZ
Supervisor of Junior High School Industrial Arts
Marshalltown, Iowa

Whenever you open a can of varnish the surface of the finish comes in contact with the air. The more varnish you use from the container the more air space you create between the lid and the surface of the liquid. When varnish comes in contact with the air a drying process takes place and a film of dried varnish is left on the surface finished. The same thing will happen to the finish inside the container. The amount of air between the lid and the surface of the finish will be used up by the varnish causing a film to form on the unused portion left in the container. Through long experience and much testing a way has been found to completely prevent this film from forming on the surface inside the can. Each time you open a can of finish and take some from the container, you must place the lid on firmly to seal it. This step every shop teacher does. To prevent a film forming at this point is the problem. Experience has proved that if you hold the can at the top and bottom with both hands and shake it vigorously for a few seconds no film will form. Tests show no film will form even though there is only one inch or less of varnish left in the can. The amount of vigorous shaking required depends on how much finish has been removed. The time will vary between a few seconds to as much as twenty seconds. Prolonging the shaking will not hurt. What has been said here about varnish will apply to paint and enamel. The same results are assured.

What takes place with the unused portion of finish in the container can be explained. Tests show that the air must be thoroughly mixed with the unused portion of the finish in the container. The air, which slowly comes out of the liquid, unites with the thin film on the lid and sides of the container. On this film the drying process takes place and not on the surface of the finish. This is hardly believable, but it is exactly what happens. You will notice on the under side of the lid after a portion of the varnish has been removed a semi-hardened group of droplets is formed. The upward movement of the air from the liquid produces a film on the underside of the lid rather than a film on the surface of the liquid. Another significant thing is noticeable too. The film formed on the lid uses up the air in the can and a partial vacuum is formed. To prove this, set the varnish container aside for several days, remove the lid slowly and you will hear a swishing movement of air entering the can.

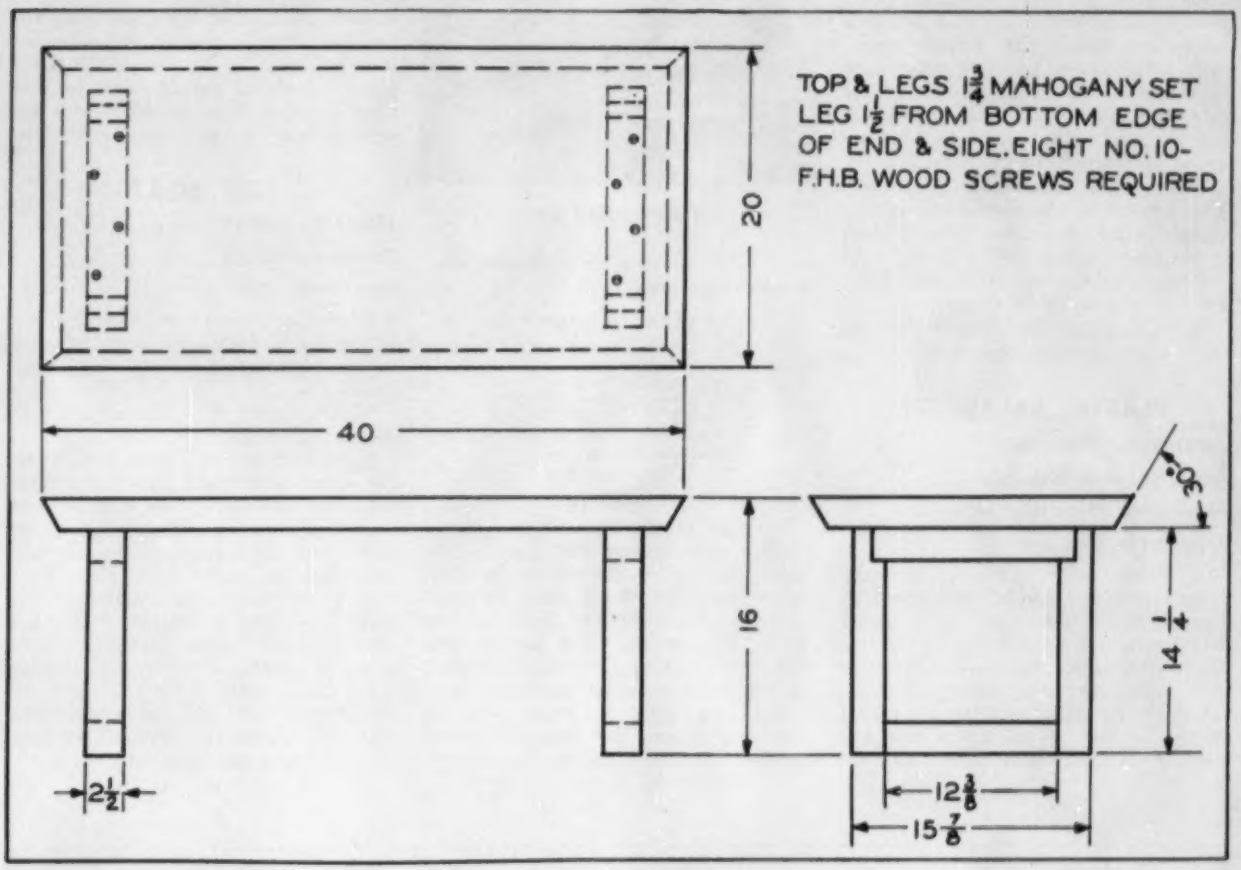
Are you still skeptical? If you are, give it a try anyway. You can do no harm. By so doing you will discover a unique way of solving one of your disagreeable finish room problems.

MODERN COFFEE TABLE

MICHAEL RHEA
Pacific Beach Junior High School
San Diego, Calif.

The coffee table described and pictured herein is especially adapted to help students develop confidence. There is no difficult phase of construction, and even though it is simple in construction it has much appeal when completed. Thus mentally enriching the student with a rewarding experience in building a functional and pleasing piece of furniture. With this point of view in mind it is an ideal project for ninth grade students.

Simple coffee table



Detail drawing of the modern coffee table

The legs are straight and sturdy and conform to the modern day straight line design. Attaching the legs and making them rigid (which is often troublesome) is assured with this table, and yet not difficult to achieve. The upper member of each leg is a rabbet joint that actually supports all the weight of the top. The bottom piece is a common butt joint that does not add to the structural strength, but does enhance the total design. Both cross members of the legs are glued to the upright members and fastened to the top with steel screws. When boring holes for the screws a ½-in. hole is bored half the depth of the thickness of the wood, and the shank hole is then bored through the ½-in. hole and the remaining stock. The angle on all four sides of the table top is 30 deg. This serves to hide, at least to some degree, appealing end grain.

With reasonable care in finishing, the student will enjoy the pride of a project well done, and gain the self-confidence and esteem which are so vitally essential to his adolescent needs.

One out of three American school children has inadequate vision for school performance. — *American Optometric Association.*

FINISHING CHAMPAGNE MAHOGANY

ARTHUR M. BAGLEY
Industrial Arts Instructor
Elizabeth City State Teachers College
Elizabeth City, N. C.

This finishing schedule for champagne mahogany was worked out for use in the school shop to produce a professional blonde finish. If followed, it will produce a beautiful blonde finish in a relatively short period of time. The process is as follows:

1. Bleach project with a commercial wood bleach. When using a bleach composed of two solutions, mix the two solutions according to directions given and apply as one solution rather than applying them separately. As the mixture is stronger than either of the single solutions alone, more care should be used when applying.

After the mahogany color has been bleached out, the wood may tend to have a yellowish color. This color will disappear in the next step.

2. To stop the action of the bleach, neutralize with a solution of half white vinegar and half water. (Even if the bleach is supposed to be self-neutralizing use this step.) Allow 24 hours to dry; then sand with 5/0 sandpaper.

3. Stain with champagne oil stain. Allow 12 hours to dry.

4. Mix white paste wood filler with champagne oil stain to the consistency of heavy paint. Using a brush, apply filler to wood. Brush with and across the grain working the filler into the pores of the wood. Allow the gloss on the surface to disappear. Using a piece of burlap or other coarse material, wipe across the grain with a clean cloth to remove the surplus filler. Wipe in such way as to pack the filler into the pores of the wood.

Apply filler to one complete area at a time. Allow 48 hours to dry. If project appears lighter than desired, sand lightly with 4/0 steel wool.

5. Apply a sealer to prevent the filler from lifting. Since the final finish will be lacquer, use the best sealer for use under the lacquer. This sealer is made of 1 part shellac-mixing lacquer, 1 part white shellac, and 1 part alcohol. Apply with a soft brush. Allow 4 to 6 hours for drying. Sand lightly with 5/0 abrasive paper.

6. The final finish is water white lacquer. Many instructors are afraid to use lacquer in the school shop because it dries very

rapidly. Once you have used brushing lacquer cut with 1 part lacquer thinner to 1 part lacquer, you will never want to use any other finish because of the ease with which it can be applied and the relatively short period of time required to complete the finish.

Using a soft brush, apply the lacquer. Keep brush full of lacquer and brush only enough to spread evenly. Allow 4 hours to dry. Sand lightly with 3/0 steel wool and apply second coat of lacquer. Allow a 4 to 6 hour period for drying.

7. Sand lightly with 3/0 steel wool and apply a coat of white paste wax.

PLASTIC SALAD SET

ARCHIE M. TIMMONS
Industrial Arts Instructor
Milwaukie Union High School
Milwaukie, Ore.

A set of salad servers in the contemporary design is always welcome. This pair, made of clear plastic, has a quality of lightness and delicacy that will fit into any interior scheme. The servers are formed in a simple but very functional design which can be easily made, with a limited number of tools, in the school shop. The contrast of black lucite plastic with the clear lucite plastic gives a finished professional appearance.

Plastic salad set

BILL OF MATERIALS

No. of Pieces	*Material*	*Size*
1	Clear lucite plastic	⅛ x 2¼ x 10
1	Black lucite plastic	1/16 x 2¼ x 3½
	Ethylene dichloride	

Procedure

Begin by drawing the design on ¼-in. square paper. Cement the paper to the clear plastic and roughly cut out the shape on the band saw. The handles are made in the same way. Roughly sand the edges with 2/0 paper and finish sanding with 6/0 paper. Cement the handles in place with ethylene dichloride and allow them to dry for 24 hours. In one of the pieces saw teeth to form the fork. Smooth the edges of the teeth with 2/0, 6/0, and 8/0 abrasive paper. Heat the spoon piece and the fork over an electric hot plate and form a curve to fit the drawing. Finish the pieces by buffing the flat surfaces with white diamond. Sand the edges with 8/0 wet-dry paper, giving a mat finish.

TOY BOAT

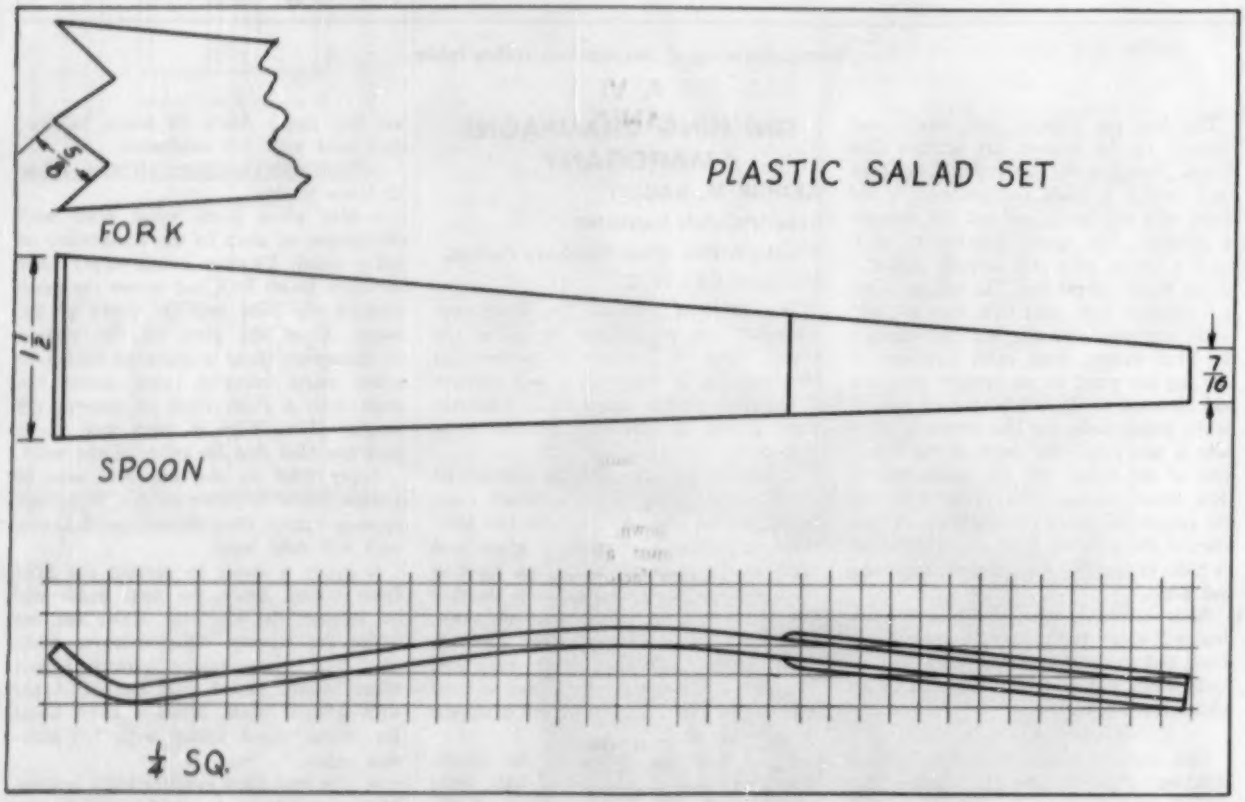
JOHN A. CAREY
St. Mark's School
Southboro, Mass.

Where can I find a new, interesting, and stimulating project that incorporates many of the fundamental woodworking operations?

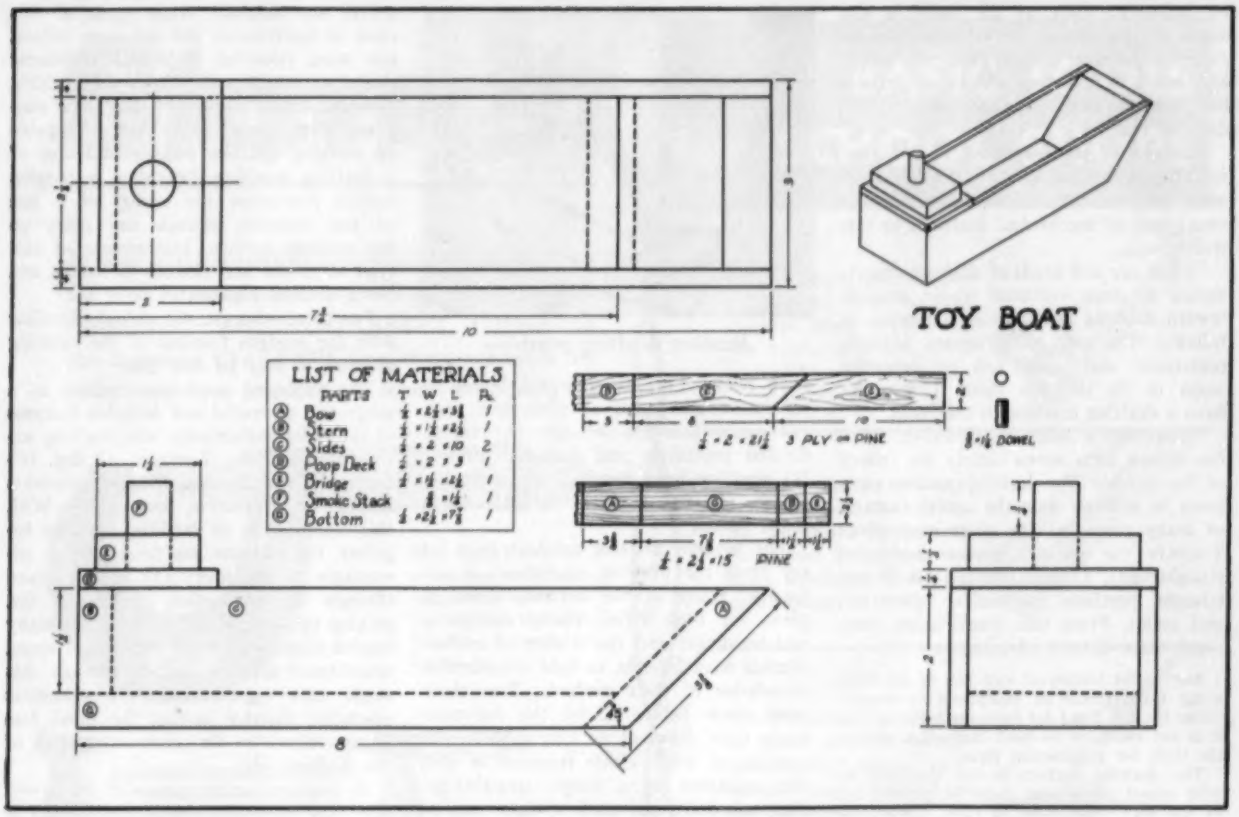
That question has, and always will, plague shop teachers.

Since I knew that the problem would not be solved with any plans I had available, the solution to the situation was handed to my seventh grade woodworking class. With some directing, the class decided that the project should utilize most of the hand tools in the construction, yet take a short time to complete. After much discussion and looking through published plans, we agreed to make our own plans for a simple boat.

Each boy made his own set of plans, with many sketches and views drawn upon the blackboard as a guide. Any changes in



Detail drawing of the plastic salad set



Detail drawing and list of materials for making the toy boat

design, that seemed necessary, were carefully considered and incorporated by each student if he thought the change applicable to his own use.

The basic design called for three pieces of stock, (1) ½ by 2 by 21½ pine or plywood, (2) ½ by 2½ by 15 pine, (3) a piece of ¾ by 1¼ doweling.

If each boat part was measured and cut off carefully, and then the next part measured and cut (the miter box was used to cut the bow from the bottom at 45 deg.), the students had little trouble getting their boats ready for assembling in a class period.

At this point the first year mechanical drawing class was asked to watch the progress of building the boat, and as an assignment, the class was asked to make a working drawing of the boat.

It was important that the finished project was to be a gift to a younger child, as no seventh grader wished to be accused of making toys for his own use.

The interest of the woodworking and drawing students was evident in the gratifying results, and the *toy boats* were in the hands of interested boy and girl sailors soon after the paint had dried.

Ten thousand barrels of petroleum can be unloaded from an oil barge in 12 hours. — *Petroleum Newsnotes.*

DRAFTING A VITAL ROLE IN PLANNING

LYNE S. METCALFE

New York City, N. Y.

Over the years, a high quantity of drafting and drawing has played an increasingly vital role in the planning field. This preliminary work, too, has involved an increasing and often large segment of the work of planning production.

Advances in the cost of employing skilled draftsmen have been rapid and today represent a surprisingly high percentage of costs. The fact is that with the pay of draftsmen rising to $1.75 and higher an hour many shops have turned to mechanical aids as a means of keeping these rising costs down.

Consideration must also be given to speed and accuracy factors, since demands made today on the ever more complicated business of planning, exert steadily growing pressure on the drafting room.

The development and gradual improvement of mechanical drafting devices and techniques have provided the answer to this problem for a growing list which are turning to the wider use of the machine. The supervision of many of these drafting rooms have found that today's greatly improved type of drafting machine *will* save from 20 to 65 per cent of the time required for a given drafting job, depending upon its character and conditions — from the development of original types of mechanical designs to copying drawings which involve some redesigning.

Here are some of the figures in detail:

Type of Drafting	*Percentage of Time Saved*
Original designs	
Mechanical	10 to 30
Architectural	20 to 40
Reworking original designs	
Mechanical	20 to 50
Designing repairs	
Ships and buildings	40 to 60
Redesigning working equipment	
Mechanical	40 to 60
Copying working drawings with some redesigning	50 to 80

Many draftsmen have deferred consideration of introducing the mechanical aids for drafting, or even of looking into its possibilities, because of a feeling, engendered over a long period of time, that "the older methods are the best," etc.

Let's see just what the modern improved drafting machine brings to the drawing table that can be of advantage to the draftsman and to his supervisor:

Improvements in these units have been steady and striking. More and more the needs for labor- and cost-saving methods have been sought by the profession and

by industry. First of all there is the much desired factor of simplification in procedure and in board work which not only tends to speed up a drawing project, but also to meet deadlines and reduce drafting costs.

Said one of the executives of a Manufacturing company which plays a prominent part in the development and advancement of mechanical drafting, to this writer:

"There are still heads of drafting departments in large concerns whose attitude toward drafting machines is somewhat as follows: 'The good old T square, triangle, protractor, and scales can be depended upon to do the job right. I wouldn't have a drafting machine in the room.'

"However, a brief consideration of a few salient facts shows clearly the fallacy of this attitude. The drafting machine combines in a *single unit* the useful features of many pieces of the older equipment: T-square (or parallel motion horizontal straightedge), 45 deg. triangle, 60-30 deg. triangle, precision mechanical protractor, and scales. From this combination there result three distinct advantages:

Any useful feature of any one of the foregoing listed pieces of equipment is directly under the left hand for immediate use so that it is not necessary to hunt through a pile on the table for a particular piece.

The drawing surface is not cluttered up with many pieces that must be pushed out of the way from time to time, but is left clear for convenient working.

Most important of all, the operations of the drafting machine are so simple that they soon become automatic and the mind is left free to concentrate on the constructive work of drafting.

These advantages result in worth-while savings of time.

The standard drafting machine and the civil engineer's machine are two basic types most widely used. The one is for mechanical and architectural drawing and for general all-round drafting. The protractor is divided to 1 degree and is provided with a single row of figures by quadrants; a double vernier reads to single minutes.

The civil engineer's type is highly specialized for accuracy in map making. The protractor is divided to ½ degree; the double vernier reads to 1 minute; two rows of figures are provided — one by quadrants and one from 0 to 360 degrees. Both types are furnished with either 24-, 30-, or 36-in. arms depending upon the size of the board to be used. Special length arms for specific types of drafting jobs can be furnished on request.

Additional features of the improved machine: (*a*) automatic indexing — with thumb piece control for 15 per cent indexing and free angle setting; (*b*) simple, positive band tightening; (*c*) flexibility — arms pivoted in brackets to let scales lie flat; (*d*) versatilt, to provide free floating motion over the board when tilted up to angles of 20 deg. or more; (*e*) positive

Modern drafting machine

scale holder; (*f*) central skid button — for easier movement of scale arm; (*g*) full circle base-line setting; (*h*) engine divided protractor and flush-set vernier; (*i*) drafting head handle; (*j*) reversible elbow; (*k*) full circle action; (*l*) single screw clamp.

The modern drafting machine is a far cry from the drafting equipment of antiquity. Many of the ancients drew up plans for their cities, roads, aqueducts, and buildings; and the studies of archaeologists have brought to light considerable knowledge of their methods. Two thousand years before Christ the Assyrians made their drawings on clay tablets with a stylus of wood, either freehand or with the assistance of a simple straightedge. Egyptain draftsmen made straight lines on slabs of wood or stone by snapping a stretched, inked string against the surface in somewhat the same manner as modern masons, and other workmen in the building trades use the chalk line. Circles were seldom used by either of these peoples, and then were laid out with the aid of a piece of string. Except for right angles, angular measurement was seldom employed by draftsmen, although well developed by astronomers. Roman architects of the time of Christ used compasses of bronze and rulers of wood, ivory, and bronze. Lines and circles were impressed upon surfaces of waxed wood, papyrus, or skins of animals by means of a bronze stylus.

Mechanical aids were slow in developing. Although the simple linked pair of rulers for parallel lines was in general use in the early part of the eighteenth century, it was not until about 1880 that mechanical devices were developed to carry parallel motion protractors over considerable areas of the drawing surface. These early instruments were designed primarily for working on navigator's charts, rather than for draftsmen. One form comprised two parallel rollers, carrying the chart and mounted on opposite sides of a table, and a protractor mounted above the table and capable of motion parallel to the axes of said rollers. By a combination of turning the rollers and sliding the protractor, the latter could be positioned at any point on the chart. A protractor arm carrying a straightedge or scale could readily be set to any azimuth. Some types of this class of instruments did not have rollers, but were provided with two rectilinear sliding mounts normal to each other which, in effect, could accomplish the same purpose. Here, then, were devices capable of carrying out the fundamental aim of a drafting machine, providing a parallel motion protractor for laying off a line of any azimuth through any point on the drawing surface. Instruments of this type were stiff and akward to handle and never became popular.

For those who are not entirely familiar with the modern features of the drawing machine it may be said that:

The improved machines combine in a single unit all useful and desirable features of the older individually used drafting accessories such as: T-square, 45 deg. triangle, 60 and 30 deg. triangle, precision mechanical protractor, and scales. With this combination of facilities working together, the machine has three distinct advantages to the user: (1) greater speed through the elimination of hunting for, picking up, and adjusting the individually needed equipment, listed above; (2) clean, uncluttered drawing surface through this single unit organization; (3) automatic operation thereby leaving the mind free to concentrate on the constructive work of the drafting job.

A feature is the *coin-slot* brake — a new type of brake arrangement which is easily controlled and holds its adjustment. The *coin-slot* of the adjusting screw is located on the top of the elbow, convenient to the user, but not readily disturbed by accidental handling. A newly developed brake lining of finer texture and greater durability than the older materials is now used. Larger braking areas than are generally employed in instruments of this class also contribute to better performance. The result is quiet and smooth operation.

Suggested reading on this topic, "Historical Note on Drawing Instruments," write to Frank E. Vaughan, Box 850-M 758 Fair Oaks, Pasadena, California.

The bringing to one instrument the services and advantages of many was probably inevitable from the very beginning of the drawing and drafting arts, since that very art itself is concerned with helping develop and produce thousands of other articles, tools, machines, and other items which themselves have become more efficient and valuable to the world as a result.

Today, one Army engine powers seven different vehicles — a light tank, a personnel carrier, a cargo tractor, the 280-mm gun, the self-propelled twin 40-mm gun, 105-mm gun, and the 155-mm artillery carriages. — *Wisconsin Military District Public Information Office.*

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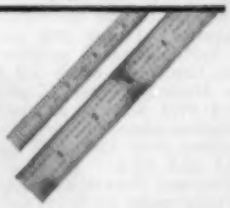

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PERSONAL NEWS

(Continued from page 6A)

educational field. He then entered Stout Institute, Menomonie, Wis., and received a two-year diploma.

Six years after his arrival in this country, he was appointed director of manual arts, State Normal School, Ada, Okla. He returned to Stout Institute for his B.S. degree and later earned an M.A. degree from the University of Southern California. His formal education also included work at Bradley Polytechnic Institute, the University of Chicago, and the University of California.

Professor Ericson was appointed supervisor of arts and industrial arts at Okmulgee, Okla., where he remained for two years.

He became assistant book editor and editor of the "Manual Training Magazine" for the Manual Arts Press in Peoria, Ill. This publication later became the "Industrial Education Magazine." During this period, from 1921 to 1925, he was a member of the Manual Arts Conference which was later changed to the Mississippi Valley Conference.

In 1925 he was appointed head of the industrial-education department at Santa Barbara State College, a position which he held until 1948.

Professor Ericson inaugurated the extension division under the State College and became its first and only director. When the college became part of the University of California in 1944 he continued as extension representative, becoming assistant director in charge of the central coastal area, a position he is also leaving upon retirement.

In 1952 he was named the recipient of the "Ship's Citation," a national award for outstanding service and leadership in the field of industrial arts, one of two west coast men ever to receive this honor.

His writings include more than 150 professional articles and 14 books, one of which, "Teaching the Industrial Arts," has been adopted as a text in 139 colleges.

He was one of the founders and the first chairman of the Standards of Attainment Committee of the American Vocational Association, and he is presently the only west coast member of a national committee on Accreditation in industrial-arts teacher education.

PROFESSOR H. G. McCOMB RETIRES

Prof. H. G. McComb, a member of the State Department of Education, and former staff member in Industrial Education at Purdue University, West Lafayette, Ind., retired from his position as Indiana State Supervisor of Vocational Industrial and Distributive Education on June 30, 1956.

Presentation of portrait to Mr. H. G. McComb

Professor McComb was born and reared in Wisconsin. He was graduated from the Fort Atkinson, Wis., High School in the class of 1897, and continued his education at the Whitewater Normal School, Stout Institute, the University of Chicago, and other mid-western institutions. He spent two years in Porto Rico.

He came to Indiana in 1919 and spent some time in the capacity of director of vocational education at Richmond, Ind. In 1920 he was called to the State Office as Supervisor of Trade and Industrial Education.

In 1925 Mr. McComb was added to the teacher training staff in industrial education at Purdue University, where he remained until 1940 when his work was interrupted by the gathering war clouds. Later he received a call to return to the State Department of Public Instruction, as Director of the War Production Training Program. During a portion of the war years, he served as State Supervisor also. Upon the close of the war period, he took over full time as the State Supervisor of both the Industrial Education and the Distributive Education programs for the State Department.

Mr. McComb was an active participant in numerous professional organizations. Among them are the American Vocational Association in which he holds a life membership and a long record of attendance; the Indiana Council of Local Directors of Vocational Education; the Indiana Industrial Education Association; the Indiana Vocational Association; American Society of Training Directors; the National Association of State Trade and Industrial Supervisors; Iota Lambda Sigma, and others.

Recognition dinners were held in honor of Mr. and Mrs. McComb by his co-workers in the State Office and State Organizations to mark his entrance into the ranks of deserving *emeritus*.

MAXIMILLIAN KOMOW RETIRES

Maximillian Komow, director of the bureau of vocational activities in the board of education of the city of New York, retires on September 1, 1956, after 48 years of service in education.

On April 28 a Testimonial Luncheon in his honor was held at the Hotel Biltmore in New York City. On this occasion a bound volume of letters of laudation and best wishes from co-workers, friends, and leaders in education was presented to him.

Maximillian Komow

Mr. Komow has had a part in the growth of industrial arts and vocational education in the United States from its earliest beginnings.

He began his relationship with the New York City School System in 1909 as an engineer in the Bureau of Construction. There he participated in the design of many school buildings.

From 1911 to 1918 he taught mechanical drawing in Stuyvesant Evening Trade School. In 1914 he began his career as a vocational high school teacher in Murray Hill Vocational High School, and continued there until he was assigned to the Bureau of Vocational Activities when it was organized in 1918. In 1939 he was assigned to full charge of the Bureau of Vocational Activities.

During his long career he has been given many honors, among them Laureate Honors in Epsilon Pi Tau and the Presidency of the New York State Vocational and Practical Arts Association.

Mr. Komow received the following honors at the luncheon held for him on April 28: Epsilon Pi Tau — Honorary Citation; New York State Vocational and Practical Arts Association — Outstanding Service Medallion — Honorary Life Membership; New York City Vocational High School Teachers Association — Outstanding Service Medallion; Associated Teachers of Industrial Arts, City of New York — Outstanding Service Plaque; in addition to a leather-bound volume of letters from leaders in education, industry, and community activities in the United States and foreign countries.

Mr. Komow was guest of honor at the annual spring conference held at State Teachers College, Oswego, N. Y.

Friends and associates of Mr. Komow are sorry to see him leave the field of vocational activities, to which he devoted so many years. Best wishes are extended to him for health and strength, happiness and contentment for the years ahead.

ESTELL H. CURRY RECEIVES APPOINTMENT

Estell H. Curry was appointed to the position of divisional supervisor of industrial arts for the Detroit Public Schools, Detroit, Mich., on March 28, 1956. Mr. Curry has been with the Detroit Public Schools for the past 26 years. During that time, he taught woodworking at the Davison Elementary for two

Estell H. Curry

and one-half years, eight years at the McMichael Junior High School, teaching household mechanics and general woodworking, ten years at the Durfee Junior High School as a supervising teacher for Wayne University, and six years at the Jefferson Junior High School as head of the practical arts department. He has been a member of the co-operative faculty of Wayne University since 1937, and in that capacity he has taught various shop and method courses. In the spring of 1950, the Michigan Industrial Education Society honored Mr. Curry for his work as an industrial-arts teacher by selecting him as Michigan's master teacher of the year. Mr. Curry received his elementary and high school education in Minnesota, his bachelor of science degree from Stout State College, Menomonie, Wis., and his master of arts degree from Wayne University, Detroit, Mich. He has also completed an additional year of graduate work at the University of Missouri on the postmasters level under the direction of Dr. H. H. London.

To increase his training and work experience, Mr. Curry has worked as carpenter, painter, shipping clerk, experimental worker, foreman of a construction crew, patternmaker, grinder, plant foreman, office manager, building contractor, and assistant director of a summer camp. (Continued on page 22A)

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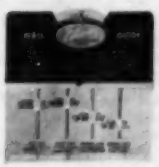

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PERSONAL NEWS

(Continued from page 20A)

Mr. Curry is the coauthor with Dr. G. Harold Silvius of two books on methods of teaching industrial education. Mr. Curry has also written various articles for professional and craft magazines. He has assisted in the development of courses of study for woodworking and household mechanics and a city-wide test for general woodworking for the Detroit public schools.

He is a charter member and past president of the Mu Sigma Pi Fraternity, a graduate professional fraternity at Wayne University. He is also a member of Phi Delta Kappa Fraternity, Detroit Teachers Association, Michigan Education Association, National Education Association, Michigan Industrial Education Society, American Industrial Arts Association, American Vocational Association, and the Detroit Schoolmens Club.

DR. BENJAMIN HENRY VAN OOT RETIRES

One of the few remaining pioneers of the early industrial education movement in America has recently announced his retirement. After 47 years of professional experience in the field of education, Dr. B. H. Van Oot, supervisor of trade and industrial education for the state of Virginia, is turning over "the reins" to one of his assistants.

Dr. Van Oot has been molding the program of industrial education training in Virginia for some 33 years.

He was born June 29, 1882, at Oswego, N. Y., and received his elementary and high school education in the public schools there. From 1901 to 1905 he was a student at the State Normal School, Oswego, where he completed the four year English and industrial-arts courses. His first professional experience started immediately after graduation from Oswego. He held a professorship in English and biology at the Normal University in New Mexico. In the years that followed he taught at Indiana, Pa., State Teachers College, and in the vocational department of the North Bennett Street Industrial School in Boston.

Dr. Benjamin Henry Van Oot

He received his baccalaureate degree from Columbia University in 1913 and his master of arts degree one year later from the same institution. During this time he served as superintendent of Saint Georges Evening Trade School in New York City. During the summers he acted as Camp Counselor at Lake Asquam and Baker Lakes in New Hampshire.

In 1914 he was state director of vocational education at Maine where he stayed for two years. He then moved to Iowa where he was professor of industrial education at Iowa State Teachers College at Cedar Falls from 1916 to 1918. During World War I he served in the U. S. Army Educational Corps in France.

After the war he was director of vocational training at the A. E. F. University of Beaune, France, which offered vocational training for soldiers preparing to enter civilian employment.

In 1924 Dr. Van Oot went to Virginia Polytechnic Institute, the State Agricultural and Mechanical Arts College. Here he was State Teacher Trainer and State Supervisor of Trade and Industrial Education. Under his direction this comparatively new field of education began to grow and his duties as State Supervisor increased. This necessitated his moving to the State Capitol where for more than three decades he has developed the vast program of trade and industrial education known throughout the State today. His wisdom and projected ideas of industrial education were soon recognized by others in the nation. This may be attested by the numerous summer sessions he conducted as guest professor in Florida, South Carolina, Pennsylvania, and Tennessee. He also piloted the War Production Training Program in Virginia during World War II. As a result of this, 105,000 persons were trained and placed in war production industries. For this service he received a special award from the United States Office of Education. For 16 years he was a Lieutenant of the Naval Reserve Training Division.

Dr. Van Oot was awarded his doctor of philosophy degree by Columbia University in 1931.

Throughout his long career Dr. Van Oot has engaged in numerous phases of education, and he has been a prolific writer. His

(Continued on page 24A)

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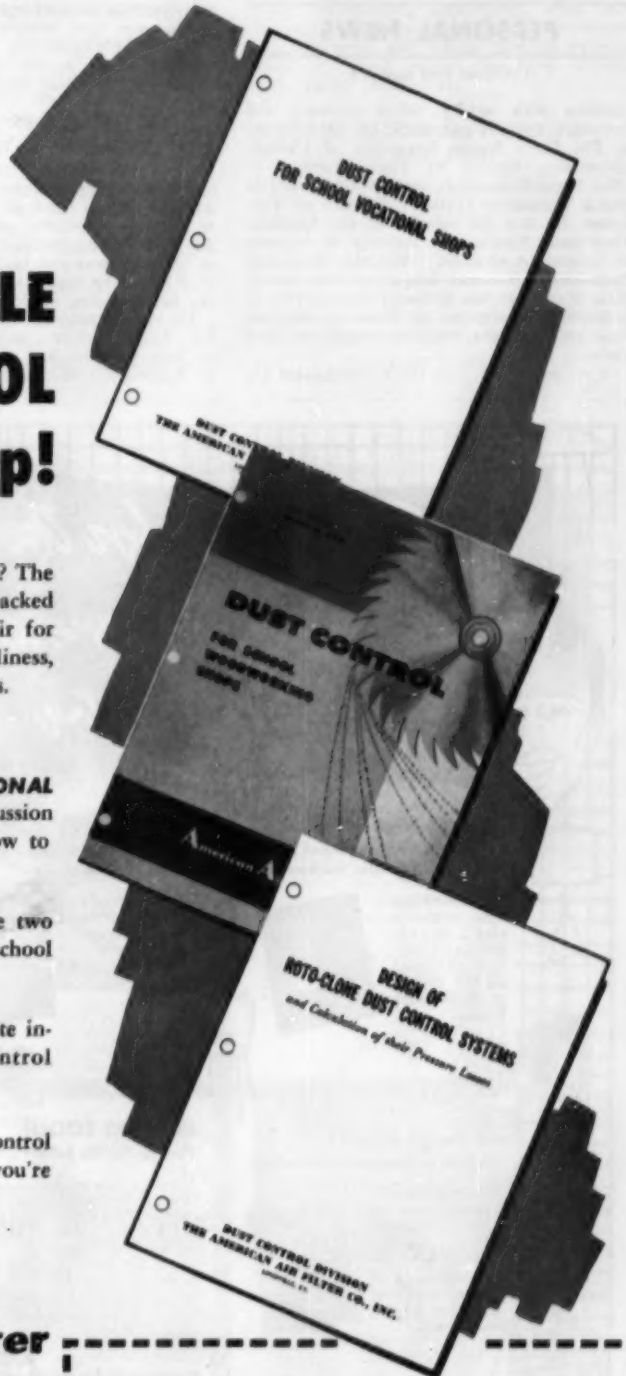

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PERSONAL NEWS

(Continued from page 22A)

standing with faculty, fellow students, and contemporaries is suggested by his election to Phi Delta Kappa Fraternity of Chicago University; Epsilon Pi Tau Fraternity of Ohio State University; and to Iota Lambda Sigma Fraternity of the University of Tennessee. He is a life member of the American Vocational Association; member of Virginia Vocational Association; Virginia Education Association; National Education Association; State Apprenticeship Council; Governor's Coordinating Committee of three on Defense Training; and the Training Service in Civil Defense.

A review of Dr. Van Oot's professional life is incomplete without reference to the many young men and women whose lives were guided by his leadership. Opportunities were afforded many in the field who otherwise would not have had their talents recognized.

VICTOR JAMES SMITH DIES

The career of Victor James Smith,, former head of the industrial education department of Sul Ross State College, Alpine, Tex., ended with his sudden death on May 3, 1956. V. J., as he was familiarly called, was the first Sul Ross faculty member to report for duty in 1919. He was sent to Alpine by the Board of Regents to supervise the construction of the first building on the campus.

He taught manual training in Cuero and San Angelo before coming to Alpine. Prior to that time he had served in the School of Automobile Mechanics at Camp Mabry, Austin, Tex., during World War I. He had a variety of trade experience, but realized the need for more formal education and obtained leave of absence to complete the Ph.B. degree from the University of Chicago in 1923. Later he went to Columbia University and was graduated with the master of arts and the Professional Diploma, Supervision of Industrial Arts.

Victor James Smith

He was granted another leave of absence from Sul Ross in 1928–29 to serve as Director of El Paso Vocational School.

During World War II, Mr. Smith was in charge of the Navy V-5 program on the campus of Sul Ross State College. When the V-5 program was closed and the WACS took over the facilities of the college, Mr. Smith was sent to Fort Knox as a supervisor in the Army training program.

In addition to his interest in industrial education, Mr. Smith was a recognized authority in archaeological research, especially Indian Hieroglyphics. He was the only licensed architect in the entire Big Bend area. He was instrumental in the organization of the West Texas Historical and Scientific Society. The Big Bend Memorial Museum on the campus of Sul Ross was built with WPA labor according to his plans and under his supervision.

He had served as president of many organizations, including, Texas Folklore Society, Texas Archaeological and Paleontological Society, Texas State Teachers Association, and American Anthropological Association. He was a member of the Texas Society of Architects, American Industrial Arts Association, American Council for Industrial Arts Teacher Education, American Association for the Advancement of Science, Epsilon Pi Tau, and many others.

Mr. Smith retired in 1952 to devote his entire time to the field of architecture and to assist with the further development of the Big Bend Museum.

He is survived by his wife, Alma Smith, three sons, Ross, Harlan, and Hal, one daughter, Mrs. Rose Ann LeMasters, and seven grandchildren.

HOMER C. ROSE IN NEW POSITION

Dr. Homer C. Rose has resigned from his position with the Training Division, U. S. Navy, to accept the position of Chief, Training Division, Civil Aeronautics Administration, Washington, D. C.

For the past ten years Dr. Rose has been employed by the Navy as a Senior Training Specialist. During the war years he was a member of the Instructor Training staff at Fort Knox, and also entered the Army as a private in 1943. He was transferred to the Navy, and was released to inactive duty as a Lt. Commander in 1946.

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Prior to that time, and after graduation from Stout State College in 1931, he held several teaching positions, the last of which was at Southern Illinois University.

H. W. CARMICHAEL RESIGNS

H. W. Carmichael has resigned from his position as state supervisor of trade and industrial education in Iowa, after serving in that capacity for 29 years.

Before joining the Department of Public Instruction, Mr. Carmichael served 12 years as an industrial-arts instructor in the Des Moines Public Schools and three years with the United States Veterans Bureau.

At the time of his appointment in 1927, the division had an enrollment of 3585 men and women in the trade and industrial classes. There were 150 classes with 113 teachers.

Under his able supervision, the division has grown tremendously. The total enrollment in trade and industrial classes for 1954–55 included 11,403 men and women organized into 468 separate classes, conducted by 265 trade and industrial teachers under the supervision of the Division of Vocational Education.

Mr. Carmichael has made a real and lasting contribution to education in Iowa. The State Department of Public Instruction joins his many friends in commending him on his long and faithful service.

MR. BEATY RECEIVES APPOINTMENT

Oran H. Beaty, who joined the staff of the Iowa State Department of Public Instruction on January 3, 1956, has been appointed to the position of State Supervisor of Trade and Industrial Education upon the resignation of H. W. Carmichael. His appointment became effective July 1, 1956.

GEORGE L. SANDVIG RECEIVES APPOINTMENT

George L. Sandvig, formerly assistant state supervisor of trade and industrial Education, Richmond, Va., will become state supervisor of trade and industrial education on September 1, 1956. This position has just been relinquished by Dr. Benjamin Henry Van Oot.

Mr. Sandvig's many years of experience as a worker in carpentry, cabinetmaking, as machine operator and shipping clerk, coupled with his experience in teaching, co-ordination, supervision, administration and foreman training, is a rich pool of knowledge. As an assistant supervisor his qualities of honesty, fairness, integrity, along with his thoroughness, tact, efficiency, and ability to get along with all persons with whom he has been associated, will be of inestimable value for him in his new position.

ARTHUR HAULER HONORED

Arthur Hauler, chairman of the industrial arts education department of the State University Teachers College in Oswego, N. Y., was honored at a testimonial dinner in May of 1956. More than 150 teachers from the Central New York Industrial Arts Club, the Mohawk Valley Industrial Education Club, and the Syracuse Industrial Arts and Vocational Education Association gathered, and many members of the State Education Department were present as well as many members of the State University Teachers College staff.

Eugene Fink, retired chief of the Bureau of Vocational Curriculum Development and Industrial Teacher Training, Albany, acted as master of ceremonies, and John Storm, newly elected president of the New York State Vocational and Practical Arts Association, paid tribute to Mr. Hauler's many contributions to the profession.

Mr. Hauler was granted honorary life memberships in the organizations represented.

PRESIDENT OPENS MEETING

President Eisenhower was present on May 14, 1956, at Constitution Hall, Washington, D. C., to open the meeting of the President's Conference on Occupational Safety. The purpose of this fifth annual conference was to further reduce the annual disabilities in American industry

James P. Mitchell, who as Secretary of Labor is the head official campaigner against industrial accidents, was in charge. He introduced Mr. Eisenhower.

Other speakers were Secretary of Agriculture Ezra Taft Benson, who discussed the seriousness of farming accidents; and Mrs. Ivy Baker Priest, Treasurer of the United States, who spoke on the problem of women in accident prevention.

The conference has enlisted co-operation from management, agricultural, labor, government, educational, insurance and private safety groups, and works through national, state, and local organizations and agencies, both public and private.

MR. STORM ELEVATED TO KEY POST

John Storm, associate professor of industrial arts at the State University Teachers College, Oswego, N. Y., has been elected to the presidency of the New York State Vocational and Practical Arts Association.

He will serve a one-year term as president.

Mr. Storm has served the New York State Vocational and Practical Arts Association in numerous capacities during the past five years.

(Continued on next page)

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Three new "package deals" of Di-Acro Precision Machines are now offered to school shops only at a new low price! Brake and Roller are Spartan models, designed especially for schools. Bender, Notcher and Shear are industry proven. Benches of heavy gauge steel are designed for efficiency and long wear. Special prices include freight to your school.
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Di-Acro Shear No. 4
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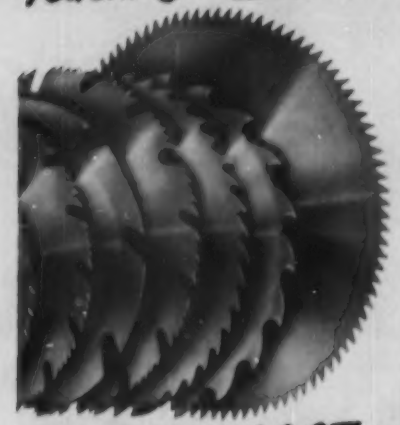

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Simonds Si-Clone Saws are made of highest grade, electric furnace alloy steel. They give you and your students smoother, straighter cuts that need less finishing, save time, assure better work. They give longer service between re-sharpenings too, because they hold their edges longer!

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Supplied with round or special shape hole

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PERSONAL NEWS

(Continued from previous page)

He served as the chairman of the industrial-arts section, on the executive committee, the auditing committee, and has done work in the past four years as treasurer of the organization.

Mr. Storm succeeds Mrs. Mildred Pascale, principal of the Queens Vocational High School in Long Island City.

DR. CATON DIES

Dr. John J. Caton, 76, founder of the Chrysler Institute of Engineering, Detroit, died on May 16, 1956.

Dr. Caton founded the Chrysler Institute in 1929 with 14 students, and when he retired in 1946, the student body was 1400. The institute was the first industry-sponsored school in North America authorized to grant engineering degrees.

Before founding the institute Dr. Caton was dean of the University of Detroit Engineering School. He had also served with the U. S. Bureau of Standards and Appeals. He was a member of the Royal Institute of England and the Franklin Institute of Philadelphia.

He is survived by three sons, and a sister.

♦ G. Wesley Ketcham, education consultant in the Bureau of Elementary and Secondary Education of the Connecticut State Department of Education, Hartford, Conn., was invited to participate in the President's Conference on Occupational Safety, held in Washington, D. C., May 14 to 16, 1956.

More than 3000 management, farm, labor, and government leaders were on hand to hear the President address the conference on the opening day.

The purpose of the Conference is to save human life and limb and to further known accident prevention measures and safety education in the plants and on the farms of America.

President Eisenhower has, for the first time, called upon the entire nation to observe "Job Safety Week" May 13–19.

♦ Edward J. Sikora is at present engaged in teaching Fundamentals of Graphic Arts and Graphic Arts Design at The State Teachers College, California, Pa.

Mr. Sikora obtained his bachelor of science degree at State Teachers College, California, Pa., in 1949 and his master of education degree at the University of Pittsburgh in 1951. His teaching experience has ranged from machine shop at Canonsburg, Pa., in 1949 for one semester to graphic arts at Beaver Falls for 6½ years. His future plans are to work toward a further degree.

♦ Loren Nicholson has been added to the faculty of California State Polytechnic College's Agricultural Journalism Department. He will be assigned to the department's advertising and management courses.

Mr. Nicholson was an honor graduate in journalism at San Jose State College in 1946, and holds a master's degree in business administration from Stanford. During army service he also had training at the University of Maryland.

Mr. Nicholson was a newspaper executive, and has spent some years as an advertising director.

♦ Leslie A. Rumsey, district supervisor of the Milwaukee Office of the Rehabilitation Division of the State Vocational and Adult Education Department since 1936, passed away at his home on March 29, 1956.

Mr. Rumsey received his diploma in 1913 and his B.S. degree in 1929 from Stout. He had done post-graduate work at Colorado Agricultural College, Fort Collins, Colo.

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Standard Pipe & Conduit — up to 1½" I.D.
Heavy Bends, Direct on Center Pin; "U" Bends on Cam Dies, 3" x 7/16" flat or ⅞" Round or Square Cold
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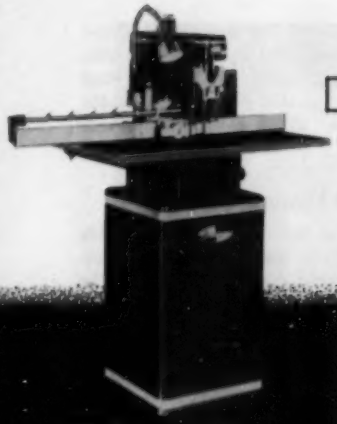

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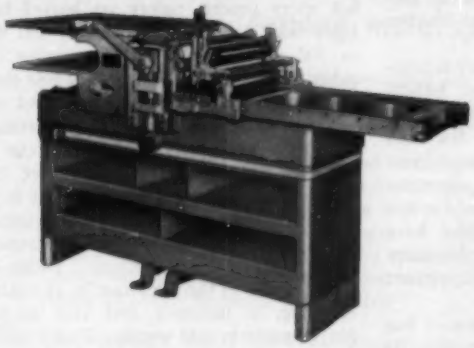

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The Use of Hot Lacquer

FOREST L. PENNY

Instructor, Furniture Finishing and Upholstering
Kansas State Teachers College
Pittsburg, Kans.

Furniture Finishing

One of the first steps in furniture finishing is to consider the characteristics of the wood to be finished and the type of finish desired. The furniture finisher has the choice of several different kinds of finish such as lacquer, varnish, shellac, oil, wax, synthetics, etc. Each type of finish has advantages and some disadvantages when compared with the other. If transparent finishes are examined, it will be found that they vary in thickness from unfilled oil and wax finishes to the very thick heavy body rubbed finishes that we find on most of the better furniture.

Factors to Consider in the Cost of Finishing

The expense of finishing varies greatly with the type of wood used, the type of finish desired, and the amount of finishing material applied. Hard nonporous woods such as maple and birch can be easily surfaced smooth and create a much simpler process of obtaining a smooth surface than do mahogany and oak that have large open pores.

For most shops the finish that dries rapidly or dries dust free in a very short time is the most desirable one to use. The finisher is constantly looking for a finish that does not spot or leave white rings when water is spilled on a surface, one that does not become cloudy or checked on exposure to wide temperature changes, one that can be made in brilliant colors or pastels, one that is transparent and brings out the full depth of the wood, and one that can be alcohol proofed. Lacquer is one of the most desirable because it has the above characteristics and needs no special drying area for storing.

There was a time when the disadvantage of lacquer was that it had a very low solid content and too many coats were required to get a satisfactory finish. With one or two coats of the low solids content lacquer there was so little body that it would wear off too quickly for the finish to give satisfactory results. While varnish and some synthetics overcome this deficiency in lacquer, their slow drying features made it imperative to have dust free rooms and much more drying space and much more care in the finishing operations.

Something About the Hot Lacquer Materials

The material used in the manufacture of lacquer, nitrocellulose is a chemical raw material for protective coatings used for the past 25 years. The use of nitrocellulose in lacquer has increased from about 2,000,000 pounds in 1919 to over 36,000,000 pounds in 1941. During this period lacquer production has increased correspondingly to occupy a substantial position in the protective coating industry. The improvement of methods and equipment for both production and application have played an important part in the use of the hot lacquer process.[1]

The method of using hot lacquer is relatively new in the United States. Before World War II the hot lacquer method was talked about by many, tried by few, and generally discarded because the equipment used was either too slow for good operation or because it was unsafe because of the fire hazard. In Europe many countries have used hot lacquer very successfully for many years. In Sweden, for example, 90 per cent of all lacquers are sprayed hot.

The theoretical value of the process has long been recognized in this country, its acceptance and adoption has been delayed because there was no practical trouble-free and economically priced heating device. Unfortunately the paint manufacturers found that it was not always a simple matter to adjust every formula for hot lacquer.[2]

With these many obstacles overcome, more recent developments in paint heaters and very important progress by the paint manufacturers have perfected hot lacquer spray formulations. The procedure is now complete so that any lacquer user who wishes to use the new advanced method can undertake to do so with reasonable success, if he will follow the correct procedure.

Why Hot Lacquer Is Desirable

The need for low viscosity, high-solids lacquer resulted in the development of improved processing methods in which the nitrocellulose fibers are now digested continuously under pressure to produce a uniform low-viscosity product with the desired properties.

The newer hot lacquer method has made it possible to apply heavier coats, thus reducing the number of layers for a given thickness of film and lowering the amount of solvent required. The recent trend in coating has been toward the reduction of the number of coats required, while still maintaining the film thickness as previously obtained with a standard application of from three to five coats. Spraying high solids lacquer has been accomplished through the use of heated lacquer by the heating principle which requires a special high grade solvent. In most cases with the hot spray process paints are heated to a fairly high temperature between 160 deg. to 200 deg. F. just before spraying. By substituting heat for thinners a whole series of benefits are possible. Labor and materials can be saved, production increased and a higher quality of finish can be achieved. It is a well-known fact that temperature plays an important part in the application characteristics of any organic finish. We have all heard the expression "slow as molasses in January." Paints can be said to be in the same family, chemically speaking, as molasses, and have as poor performance in cold weather. Every finisher has experienced the difference in spraying in winter, at 60 deg. and in the summer at 90 deg. If 30 deg. makes so much difference, how much greater benefits would be obtained if we increased the paint temperature still another 100 deg. Thus we see that the maximum objective in hot spraying is not simply to level off daily and seasonable temperature fluctuations, but to obtain thermal control at a much higher temperature than prevails on the hottest summer day thereby obtaining the maximum benefits from heat. Until now, the skilled finisher attempted in his own way to compensate for the daily and seasonable tem-

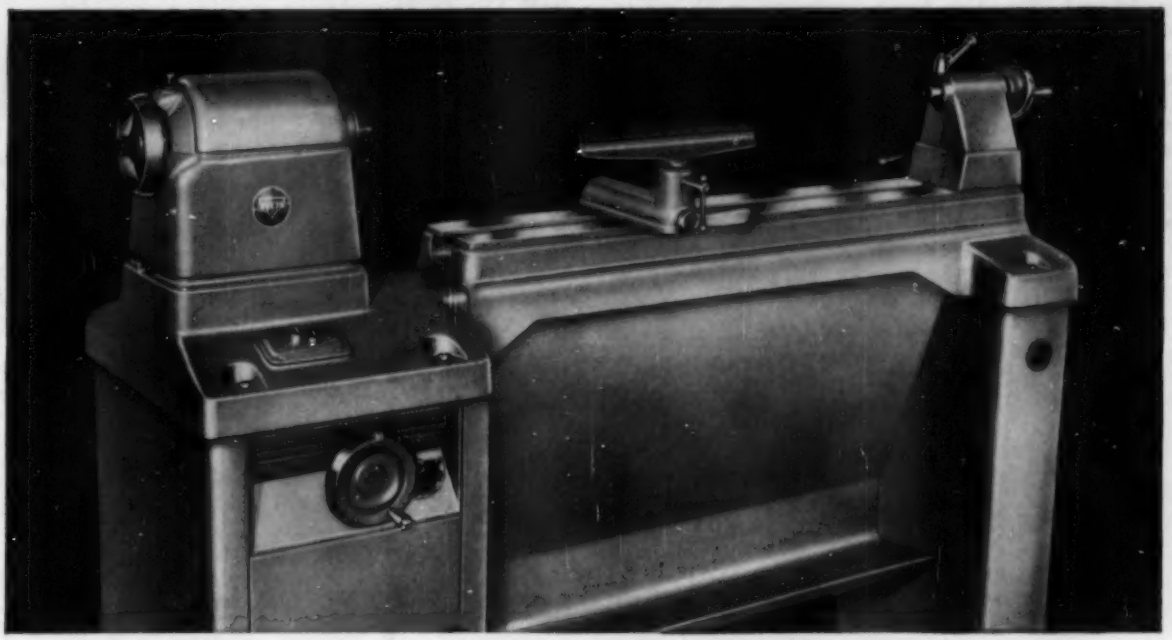
(Continued on page 30A)

[1] *A Discussion of Hot Lacquer*, The American Institute, A Division of the Americana Corporation, 2 West 45 Street, New York, N. Y.

[2] Bede, James A., *The Hot Spray Process Advantages, Causes and Effects*, Bede Products, Inc.

ROCKWELL-BUILT

new DELTA 12" wood lathe



...variable-speed, gap bed cabinet model for wood turning, metal spinning and turning light metals

—Engineered for student *safety—ideal for* student *instruction—built for years of maintenance-free* student *operation—all at a surprisingly* low *price!*

VERSATILE—New variable-speed drive gives you an extremely low 340 rpm speed for turning heavy or rough wood and light metals—plus an infinite choice of speeds up to 3200 rpm, a really *safe* speed for sanding, polishing and metal spinning. And you can do many *extra* jobs with the more than 50 Delta accessories available.

SAFE, EASY TO OPERATE—Completely covered drive mechanism makes it impossible for students to come in contact with moving parts. An extra safe push button switch, convenient hand wheels, an inclined, graduated speed indicator—plus many other safety and convenience features provide safe, simple operation.

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BUILT FOR LASTING ACCURACY—A rugged, heavily ribbed bed assures minimum vibration, absolute alignment. Massive spindle, pre-loaded sealed-for-life ball bearings and perfected variable-speed drive give you years of accurate, dependable operation with little maintenance.

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USING HOT LACQUER

(Continued from page 28A)

perature fluctuations as he encountered them. Not always was he successful, and at best the results were a compromise. Now, however, the variations caused by fluctuation temperatures can be completely eliminated, and the optimum paint temperature uniformly maintained irrespective of weather conditions.[3]

The following actions take place when hot spraying is properly adopted; the viscosity of the lacquer is greatly reduced by heat, eliminating the need for some of the thinners; a uniform condition of operation is established and the lacquer will always have the same temperature and same viscosity. By heating paint to 160 deg. F. the viscosity is generally reduced to ⅓ to ¼ of the viscosity at 70 deg. F. There is of course a natural limit to this thermal action. When the viscosity reaches approximately 12 to 13 seconds, very little further drop is encountered. The saturation point of the thermoplastic action is generally reached at approximately 160 deg. F. for synthetics but a little higher than that for lacquers.

Another important key factor to consider is the much greater loss of solvent in the process of atomization. A typical example of what takes place in hot spray in contrast to cold spray does not necessarily apply to all types of finishes. The relationship of solid content, viscosity, solvent loss in atomization, etc., will vary with the different finishes, but the ratio of variation and performance between cold and hot spray is virtually the same for all types of organic finishes.

In the process of atomization a certain amount of solvent is released from the finish. This amount varies depending upon temperature, evaporation rate of the solvent, the distance the gun is held from the surface, etc. But it is generally averaged between 16 and 22 per cent from room temperature spraying. Therefore the cost of finish deposited on the surface has a greater proportion of solids, and a lower solvent content than the original materials.

In hot spraying the solvent loss is much greater (up to 80 per cent) because the paint comes out of the gun at almost the boiling point of the solvent. This solvent loss is very desirable, providing the remaining solvent carries the burden of proper flow. This is probably the most critical factor in hot spraying and the one point which may make a hot spray test fail. However it is this very fact that brings about so many of the benefits of hot spraying.

Evaporation of the solvents, plus expansion of the compressed air causes a refrigeration action. Because of the high temperatures involved, the atomized particles in hot spray drop much more in temperature than the same particles in cold spray, but still reach the product surface at a higher temperature and with better flow characteristics than in cold spray. Some finishers mistakenly anticipate that the paint will strike the surface in a very warm state, and are disappointed in the hot spray process when they find out that this is not so. It is important to bear in mind that the atomization takes place within 1 in. of the tip of the spray gun where the opposing air streams from the cap converge. The rest of the fan action simply spreads the atomized particles to the desired pattern for easy spreading of the paint on the surface. The subsequent paint chilling can be ignored.[4]

Specific Benefits Are Had From Hot Finishes

Temperature plays an important part in the spraying properties of every finish, and there is some one ideal temperature at which it is best sprayed. At this ideal temperature atomization is most easily accomplished, and the paint particles flow out most smoothly. Finish savings can be accomplished because the heated finish requires much less air for atomization, and hence proportionally less paint particles are blown past the surface being sprayed. Too

[3] Ibid.

(Continued on page 34A)

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Give You Lasting Dependable Service

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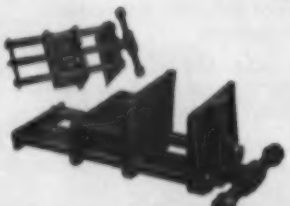

18A DUAL PURPOSE VISE

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MORGAN VISES

THE MORGAN VISE CO.

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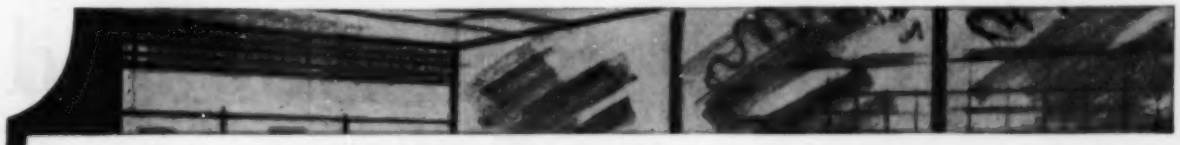
[4] Ibid.



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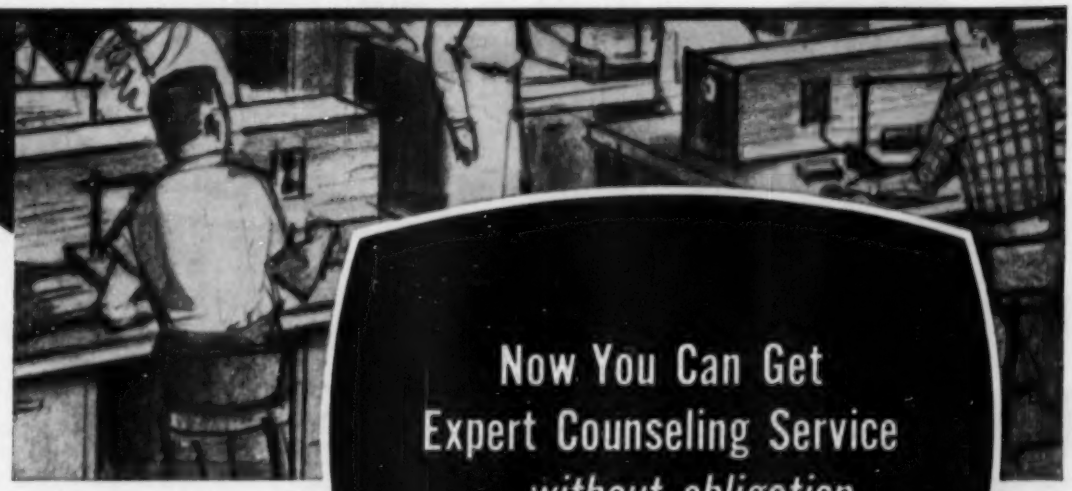

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Made with great care and economically priced, Post student drawing boards are remarkable values. Each is made of finest quality, selected basswood in a full range of standard sizes.

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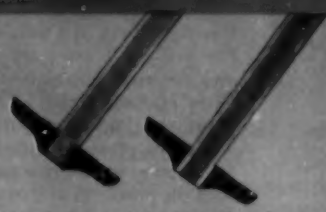

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- ***Fully guaranteed quality***—You can depend on top performance with every Post item, from erasers to drawing instruments. Close inspections prior to shipment eliminate errors and troublesome returns.
- ***Consistent prices throughout the year***—You can order at any time during the season, with the assurance that prices will stay as quoted in the school folder.
- ***Prices always competitive, often lower***—Post's special school prices give you better per-dollar value in almost every supply item. Extensive production creates economies which are passed on to you.
- ***Special school ordering service***—You can depend on Post when last minute demands make quick ordering necessary. The Educational Division is prepared at all times to give your order fast attention.
- ***Technical information***—Specifications and technical data are always available to instructors. Address all inquiries to Educational Division.

Post is always interested in the instructor's viewpoint

At association conventions and through regular field contact, Post representatives keep in touch with instructors throughout the country. From discussions of current school problems, our men carry away ideas that are often translated into new or improved products. A recent example—Post's introduction of the Rotolite Printer*, the first low-cost continuous printing unit. This economical unit enables instructors to demonstrate the actual printing process—a further step in preparing students for their future careers.*

**The Rotolite Printer is currently featured in Post's exhibitions at association conventions, as shown at right.*

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	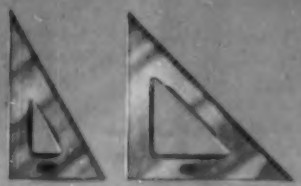	
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USING HOT LACQUER

(Continued from page 30A)

few seem to realize the great volume of finish lost in spraying.

With the correct, efficient use of the hot spray process both the spray gun and the paint can be made to work much better than before, resulting in a whole series of possible benefits. These possible benefits are:

Savings

1. Saves from 25 to 50 per cent finish materials.
2. Saves most of the thinner used before.
3. Saves on the amount of labor needed for the job.
4. Saves on rejects because of the smooth surface it produces.
5. Saves from ⅓ to ⅔ of the air formerly used to do the same work.
6. Saves on fuel costs for baking operations.
7. Saves on the use of machinery.

Better Product

1. A smoother surface can be had with less "orange peel."
2. Obtains greater film of finish and more gloss.
3. Surface imperfections cover better.

Better Production Results

1. It requires less spraying time.
2. One coat often does the work of two or three.
3. It requires less drying time and space for storing.
4. No blushing when spraying lacquer.
5. Have fewer sags and runs when sprayed properly.

Working Conditions

1. There are less solvent fumes to inhale.
2. Very little spray fog to rebound into sprayer's face.
3. Less cleaning to be done to the floor and spray booth.

In many cases the hot spray process is used to gain one or two of these specific benefits. In some cases all of them can be had at once. In spraying at room temperature a sprayer has very little latitude in his finishing adjustments. His balance in solvent content, spraying pressures, and gun stroking are restricted within very narrow limits. He has very little latitude as to how much paint can be put on the surface without sagging. But when hot spray is used the possibilities of variation and the corresponding range of benefits obtainable are many. Thus it is possible to concentrate and emphasize specific benefits.[5]

The major benefit of the hot spray process is the elimination of a large portion of the waste encountered with the normal method of spraying. Hot spraying partially reduces waste because it lowers viscosity with heat; in effect substituting heat for thinners. This enables depositing more solids with less solvents, with less spraying time and with less paint loss due to overspray. The hot spray process increases the utility of lacquers. Lacquer as a finish has some marvelous qualities of special interest to the consumer. Foremost is the fact that it gives a hard durable finish of lasting beauty. In the factory it is easy to apply and easy to touch up and repair, for it dries before dust and dirt can settle. Unfortunately lacquer has had one drawback — its high cost of application, caused by the need for large amounts of solvents to reduce it to spraying viscosity and the necessity for applying multiple coats to obtain adequate film thickness. With the hot spray process this objection is eliminated, resulting in less material cost and greater labor productivity. In a majority of cases multiple coats can be eliminated.

Desirable Conditions for Hot Lacquer

As is to be expected, there are some who have recently tried hot spraying of lacquer and found it impractical. It is erroneous to assume that hot spraying is an automatic success. To use it properly three basic steps should be followed and each step must be carried out thoroughly. Step number one is a lacquer formulated for hot spray and adjusted to the proper consistency with the right type of solvents. Second,

[5] *Ibid.*, p. 2.

(Continued on page 36A)

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USING HOT LACQUER

(Continued from page 34A)

the right type of paint heater should be selected and properly installed. Third, the finisher must approach the hot spray process with an open mind and be prepared to adjust his spray techniques correctly to take advantage of the process. The last point is probably the most important. Spraying hot material requires a special technique which should be mastered by the spray operator before attempting production spraying.[6]

[6]*Ibid.*, p. 1.

It should be borne in mind that the hot spray lacquer method is not a separate process nor a new one but rather a gradual development of the nitrocellulose lacquer process. The effect of heat on the lacquer has long been noted, but various technical problems of applications, heating, etc., had to be solved before the principle could be put to work.

Types of Paint Heaters

The past twenty years, industry has produced many useful machines for producing a better and quicker finished product. As the result of many experiments we now have well-engineered paint heaters of various designs. The main classifications are those that are *circulating* and *noncirculating*. Some have provisions for partially heating the compressed air, so as to take the chill off in the wintertime. The most desirable type of paint heater, where it can be used, is the noncirculating heater which is located very close to the spray gun. This type is desirable because there are no moving parts and therefore no maintenance headaches. The drawback, however, is that the paint cools off in the fluid hose from the heater to the gun. If the spraying is reasonably steady, the drop in temperature in the fluid hose can be easily compensated for by simply increasing the temperature in the heater to arrive at the desired temperature in the gun. However, where there is intermittent spraying, this cooling effect in the hose is so irregular that correct temperature control is not feasible. Where it is necessary to use the long hose or the spraying is done intermittently it is better to use the circulating heater. By using the circulating heater the liquid is introduced to the heater by a pump which keeps the paint in motion to the spray gun and return. With the circulating heater more accurate temperature control can be maintained. Because of the critical viscosity action of lacquers at high temperatures it is also generally advisable to use circulating heaters for lacquer.

Heating of the air is beneficial for synthetic spraying when the air comes to the spray booth excessively cold in wintertime. However, for lacquer spraying, heated air is not only unnecessary, but is actually detrimental. These facts are from a report by the Hercules Powder Company, issued after many months of investigation of hot spraying of lacquers.[7]

It is very important to consider safety of construction carefully in selecting a paint heater. Obviously, when paints are to be channeled through an electrical device, extra caution must be used, especially since the paint is heated. It is advisable to select only the paint heater that has been approved by some independent laboratory. It is not sufficient that simply some of the electrical wiring be enclosed in the approved, explosion-proof method, but the entire device as a whole must be explosion-proof, and should comply fully with the electrical code for Class 1, Group D installations.

Some of the paint heaters have been tried by the Hercules Powder Company, but because of the rapid developments, new manufacturers have appeared and old models are being improved. The following is a list of those that they have tried: The Arco Heating Unit, Arco Co., 7301 Bessemer Ave., Cleveland 4, Ohio; "Dualheet" Paint and Air Heater, Beck Equipment Co., 10118 Detroit Ave., Cleveland 2, Ohio; Bede Paint and Air Heater, Bede Products,

[7]Hercules Powder Company, Hot-Spray Application of Lacquer, Wilmington, Del.

(Continued on page 38A)

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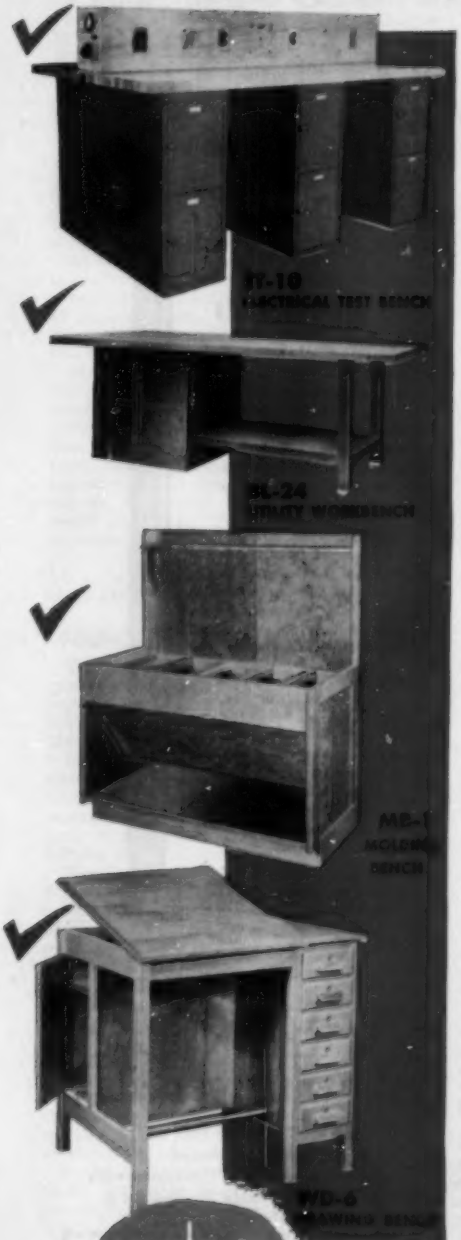

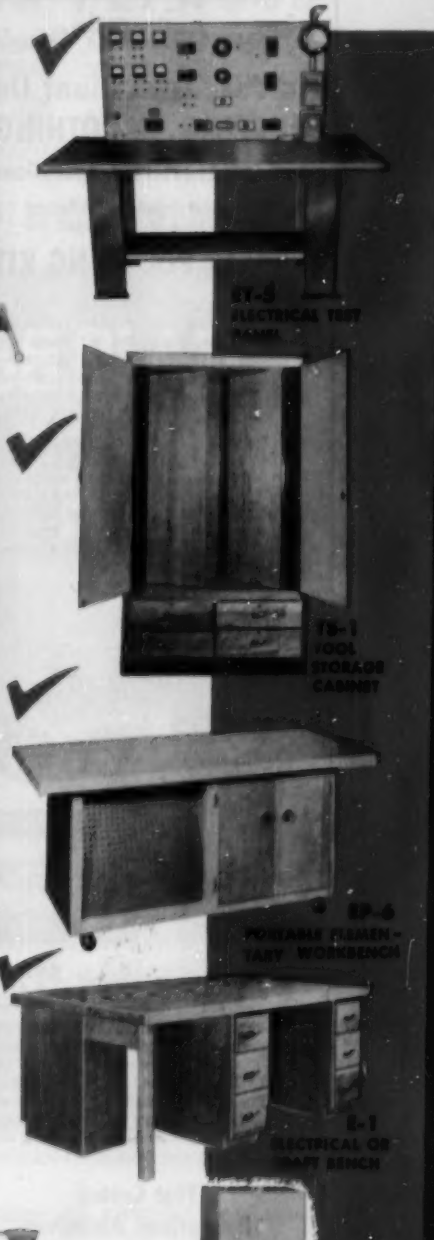

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USING HOT LACQUER

(Continued from page 36A)

Inc., 4311 Ridge Road, Cleveland 9, Ohio; DeVilbiss-Type QBH-5001 Steam Unit, The DeVilbiss Co., 296 Phillips Ave., Toledo 1, Ohio; Thermatic Unit, Model A., M & E Manufacturing Co., 2571 Winthrop Ave., Indianapolis 5, Ind.; Varmalack-Type VLS-802 and Therm-O-Spray SPC-1, Svenska Maskinaktiebolaget Greiff, Stockholm, Sweden. The American distributor is Douglas Wilson and Co., Inc., 101 Park Ave., New York 17, N. Y.[8]

What Shops Could Use Hot Lacquer

After carefully analyzing the hot lacquer process and all its benefits and savings it is only natural that all shops could not use hot lacquer. It is the opinion of the writer that high school shops and other shops where a limited amount of work is done would not warrant the cost of such a unit for this method of finishing. In a system where there is a trade shop, mill shop or where production work is done or in auto body work repair shops the hot lacquer system has a place. To make the hot lacquer system both efficient and practical there must be a fairly large volume of work turned out. Then the savings that are mentioned in this article can be realized. With the never ending research there soon will be a hot lacquer unit for all sizes and kinds of shops.

[8] *Ibid.*, p. 5.

News Notes

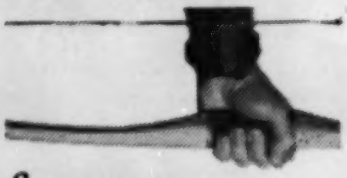
TV CAMERA BECOMES STUDY HALL MONITOR

New London, Wis., High School has installed what is believed to be the nation's first closed-circuit television-study hall monitoring system to relieve teachers of study hall duty.

On March 29, 1956, General Precision Laboratory, Inc., of Pleasantville, N. Y., manufacturers of the classroom television equipment, made the installation for Superintendent of Schools Paul K. Loofboro and the board of education.

The system, designed especially for this school, consists of a nine-inch television camera weighing only five pounds, its lens trained on the one hundred seats in the second floor study hall. The 17-inch television monitor is located in the school's general office on the first floor. Coaxial cable, concealed in the ventilating ducts in the walls, connects camera and monitor. The school's public-address system links the study hall and the office.

Mr. Loofboro is convinced that the system will save money for the school system and at the same time relieve teachers from non-teaching chores. When facing a teacher shortage and a need for economy, he believes this is the answer.



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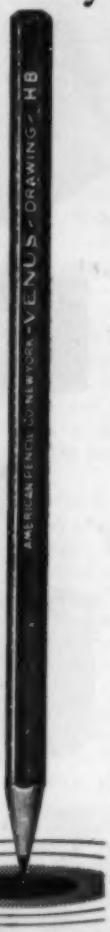

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The Superintendent explained the plan of the TV Monitor to the pupils in an assembly session before the equipment was placed in operation. They were given time to closely inspect the camera, receiver, and controls, and they have accepted the camera's presence without animosity.

A NEED FOR LIGHTING SPECIALISTS

Three thousand jobs will be created over the next five years in the United States for young engineers who want to specialize in lighting. And, at the moment, there are no engineers to fill them.

Furthermore, the lighting field for the five years beginning in 1962 will probably need another equally large batch of new technical recruits.

This was part of the story that Robert F. Hartenstein, president of the Illuminating Engineering Society, New York, told at a series of meetings throughout the United States recently at regional conferences of the society. These figures are based on a study conducted by the society's Lighting Education Committee. The series of meetings was a prelude to a national technical conference in Boston, Mass., September 17, which will mark the 50th anniversary of the organization's founding.

Mr. Hartenstein points out that only a few scattered engineering schools in our universities are now equipped to give the comprehensive courses in illuminating engineering that will develop the kind of technicians we need, but if enough would-be lighting engineers knock at the doors of our engineering schools demanding preparation for these brand new jobs, the classes will soon be organized and the laboratories equipped.

One of the primary objectives of the I.E.S., as it starts its second 50 years, will be to encourage these academic programs.

FOUNDRY INSTRUCTORS SEMINAR

The American Foundrymen's Society, an international technical society, offered for the first time a Foundry Instructors Seminar at Michigan State University, East Lansing, Mich., on June 14 to 16, 1956.

Due to limitations in housing, only five states were represented made up of instructors from vocational programs and industrial-arts programs presently teaching foundry and/or patternmaking from Michigan, Ohio, Indiana, Illinois, and Wisconsin.

The purpose of the Seminar was (1) to explore and define, for purposes of secondary school instruction, the basic functions of the castings industry — its economic importance and potential — its career opportunities for young men; (2) to foster modern methods of foundry and pattern shop instruction in terms of the latest developments in foundry and patternmaking practice; (3) to promote closer relations between secondary schools and local foundry industry, thereby fostering advanced teaching facilities and methods; and (4) to emphasize the needs of the castings industry for young men of specialized training, and to encourage their development and advancement.

Program leaders at the 1956 Seminar included authorities from the foundry industry, prominent guest educators, and faculty members of the departments of metallurgy and education at Michigan State University.

DRIVER EDUCATION

Better driving for the nation's drivers will result from the driver education teacher training work being conducted by the Association of Casualty and Surety Companies, 60 John St., New York 38, N. Y.

Thomas N. Boate, manager of the Association's Accident Prevention Department, an-

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NEWS NOTES

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nounced that staff members from the Association's home and field offices will direct, or participate in, 16 teacher training courses in 13 colleges and universities located in eight states — California, Florida, Indiana, New Mexico, Pennsylvania, South Carolina, Tennessee, and West Virginia.

Approximately 500 teachers, representing half the states in the nation, will attend these courses. On the basis of past experience, these teachers will probably train 250,000 students within the next five years.

The program of training teachers of driver education has grown until last year 10,000 of the nation's 20,080 high schools enrolled 994,212, or 62 per cent, of all eligible students.

SCHOOL PUBLIC RELATIONS WORKSHOP

The seventh annual School Public Relations Workshop was held July 8 to 11, 1956, at the Iowa State Teachers College, Cedar Falls, Iowa.

The workshop is sponsored jointly by the Iowa State Education Association and the Iowa State Teachers College.

George H. Holmes, director of college relations at I.S.T.C., was chairman.

Attending the workshop were representatives from school faculties, school boards, business, labor, PTA groups, newspapers, radio and television stations.

Various topics were discussed at the meetings. Among them was the subject, "Getting More Mileage out of the School Dollar"; also "Iowa's Basic Tax Structure and Its Effect on the Schools," and "Publicizing School Needs."

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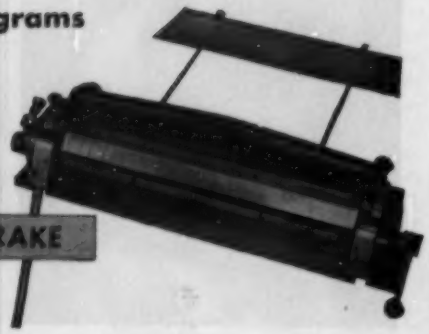

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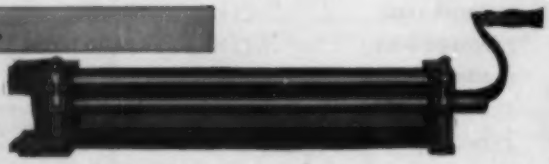

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All of the units were prepared by teachers attending summer workshops in family finance, sponsored each year by the National Committee.

Bulletin #12: *This Is For You*, 1956, a handbook for education in personal and family finance — 54 pages, 35 cents.

A handy guide for the secondary school administrator, principal, or teacher desiring to make education in family finance available to every student.

Bulletin #13: *Annotated Listing of Free and Inexpensive Teaching Aids on Education in Family Finance*, 1956, 44 pages, 30 cents. Single copy free to teachers or librarians.

Bulletin #14: *A Selected List of Materials on Education in Family Finance at the Junior College Level*, 1956, 17 pages, 20 cents. Single copy free to teachers or librarians.

Bulletin #15: *Teaching Family Finance More Effectively*, 1956, a guide for homemaking teachers, 61 pages, 35 cents.

Bulletin #7: *Guidance for Family Financial Security*, 1951, 23 pages, 15 cents.

A resource unit for 12th grade guidance and family living courses.

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The students are divided into two groups, attending school two weeks and alternating in actual jobs the other two weeks. The regular trade school course is only a two-year course, but the students attend classes on a 40-hour week basis.

Girls are usually sent to Goldberg upon the recommendation of their counselor from some other high school, either because of financial reasons, because they possess some special talents more easily cultivated at trade school, or because they express a desire to learn a trade.

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(Continued on page 42A)

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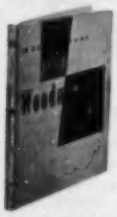

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- #14 BLUEPRINT READING AND SKETCHING *By R. Paul Lightle.* 72 pages, $0.80
- #17 BLUEPRINT READING, CHECKING and TESTING (Revised August, 1956) *By Otto A. Steinke.* Part I, instructions and questions, $1.20. Part II, blueprints (#18) $1.00
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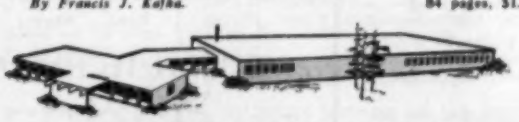

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NEWS NOTES

(Continued from page 40A)

business course, and the hospital service course. In addition to this, the students have music, art, and other extracurricular activities for self-expression, much the same as other high schools.

AMERICAN EDUCATION WEEK

The National Education Association announces the observance of American Education Week, November 11 to 17, 1956.

Origin and Purpose

American Education Week has been observed annually since 1921, when it was established by joint action of the National Education Association and the American Legion. It has always been observed "for the purpose of informing the public of the accomplishments and needs of the public schools and to secure the co-operation and support of the public in meeting these needs."

This movement is sponsored by the American Legion, the U. S. Office of Education, and the National Congress of Parents and Teachers in conjunction with the National Education Association.

The general theme of this year's observance is "Schools for a Strong America."

For further information and helps in planning your own observance of American Education Week, write to *National Education Association, 1201 Sixteenth St., N.W., Washington 6, D. C.*

ANNUAL READING INSTITUTE

The theme of the 1957 Annual Reading Institute at Temple University will be "Reading Disabilities in the Classroom and Clinic."

It will be held in Philadelphia during the week of January 28 through February 1 inclusive.

Inquiries should be directed to E. Elona Sochor, director, The Reading Clinic, Department of Psychology, Temple University, Philadelphia 22, Pa.

♦ In September, 1956, the University of Wisconsin of Milwaukee will start enrolling students for its four-year program of undergraduate instruction. Graduates will receive degrees with the same status as those granted at Madison.

The University of Wisconsin of Milwaukee is the result of legislative action taken last October. It merges the Wisconsin State College of Milwaukee and the Extension center into a single institution of higher education which will be a part of the University of Wisconsin. It will be governed by the University Regents and its provost will report directly to the president of the University.

♦ Socony Mobil Oil Co., Inc., has contributed $672,770 to higher education in the United States and Canada in 1956.

The money has been allocated as part of the company's continuing program of assistance to universities and colleges and is $348,300 more than the amount given in the 1954–55 academic year.

The company originally appropriated $442,770 for the current program, but expanded it by $250,000 to include grants to private liberal arts institutions. This $250,000 will be distributed to associations of American colleges and to specific schools.

The rest of the money is detailed for fellowships, $68,000; scholarships, $61,000; and research and other grants, $293,770.

(Continued on page 45A)

TIME TO START ANEW

Don't spoil the thrill of starting a new school year — don't kill the enthusiasm of your students — by giving them antiquated, poorly developed instruction materials.

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Give your students the thrill of accomplishment that comes from studying an up-to-date, authoritative, classroomtested book. Examine these new books. See how they reflect the most modern developments in industry and education.

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3. MASONRY SIMPLIFIED, VOLUME I: Dalzell-Townsend-Matzke. This 2nd edition contains up-to-date information on rapidly advancing new types of concrete masonry. $5.40
4. RADIO-TELEVISION AND BASIC ELECTRONICS: R. L. Oldfield. Modern exposition of the fundamentals of electronics with emphasis on radio and television. $4.95
5. MACHINE TRADES BLUEPRINT READING: Ihne-Streeter. New edition retains useful feature of large quantity of actual production blueprints. $2.95
6. METALLURGY: Johnson-Weeks. Enlarged and revised guide to physical metallurgy explains why metals behave as they do. $5.50
7. CABINETMAKING AND MILLWORK: Dahl-Wilson. New material on construction and layout methods for chests, drawers, and cabinets, and a section on stairway building are features of new 2nd edition. $6.50

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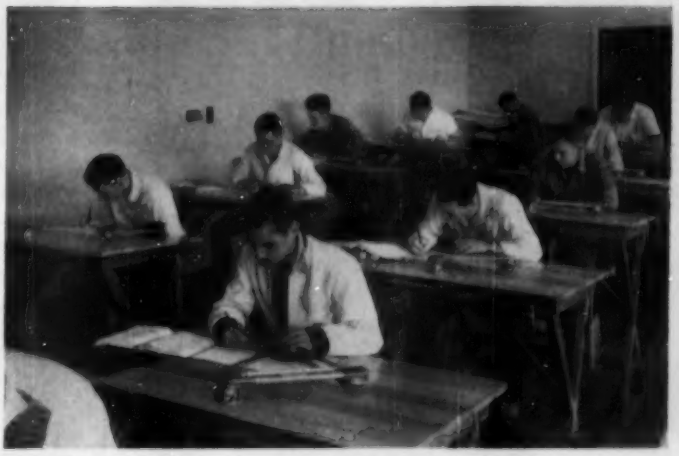

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T. Edison Bullard, Director, Division of Technical and Vocational Training.
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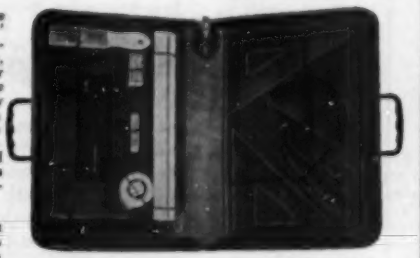

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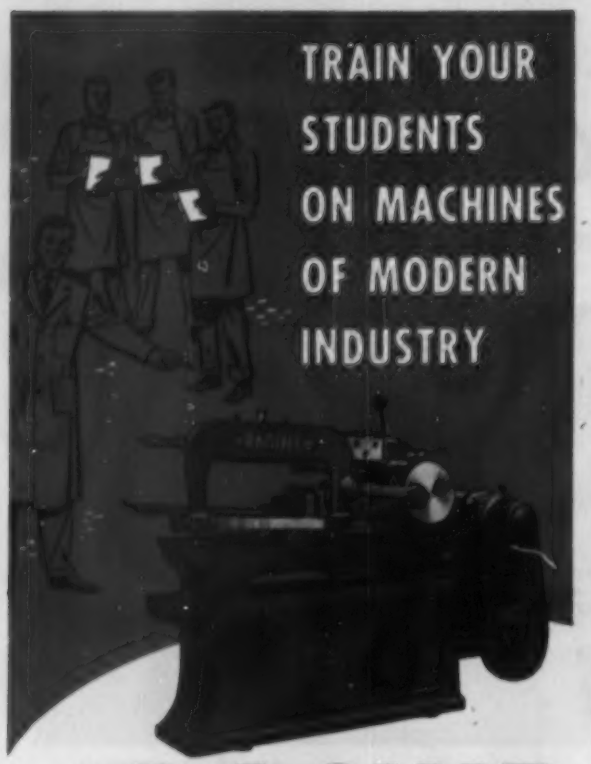

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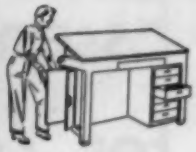

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NEWS NOTES

(Continued from page 42A)

The company has also allocated $32,000 for incentive fellowships for employees; and $67,700 for the American Petroleum Institute to further its program of fundamental research and special projects carried out in various colleges.

Contributions to education outside of the United States and Canada are made independently by the subsidiary companies of Socony Mobil in Mexico, South America, Europe, Africa, and the Middle East.

♦ A new series of filmstrips, "Your School Publications," by The Jam Handy Organization, provides the basic information for publishing school newspapers and yearbooks. The series is for use in junior and senior high school English and journalism classes.

It consists of six filmstrips in color, prepared with the assistance of teachers who themselves have for many years helped their students to produce attractive school publications.

Five of the filmstrips give pointers on how a new school newspaper can be started, or how an existing publication may be improved. The titles are "Organizing a Staff," "Finding Feature Material," "Covering the News," "Editing the Copy," and "Planning the Layout." The sixth filmstrip of the series is "Yearbook Planning and Production."

Filmstrips are available individually or in sets.

The Jam Handy Organization, 2821 East Grand Blvd., Detroit 11, Mich.

Educational television offers a way of bringing outstanding teachers of the nation into all classrooms. — *Dr. Baker, General Electric Company.*

New Publications

Analysis Technique for Instructors

By Verne C. Fryklund, Ph.D. Cloth, 179 pp., 5½ by 8 in., $2.50. The Bruce Publishing Co., 400 N. Broadway, Milwaukee 1, Wis.

A valuable book for those who teach or are preparing to teach industrial arts and vocational education. It shows how to prepare an inventory of the elements to be taught, and how to separate these elements into teaching units.

The analysis technique described in this book can be used in the preparation of courses of studies for any occupation.

The 12 chapters of the book present the material under the following headings: Analysis Techniques for Instructors, Modern Industrial Workers, Other Kinds of Analysis, Identifying Occupational Elements, Identifying Occupational Elements — Related, Making the Analysis, Making the Analysis — Procedure, Making the Analysis — Operations, Other Applications of Analysis, About Learning and Teaching, Course Development, and Written Instructions.

The appendix presents a layout for a job and operations analysis chart.

Yearbook 5 — 1956
Problems and Issues in Industrial Teacher Education

Cloth, 233 pp., 6¼ by 9¼ in. McKnight & McKnight Publishing Co., Bloomington, Ill.

This yearbook is the result of much work

(Continued on next page)

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NEW PUBLICATIONS

(Continued from previous page)

and planning by many members of the American Council on Industrial Arts Teacher Education, an affiliate of the American Industrial Arts Association.

Editor of this volume was C. Robert Hutchcroft, and Elroy W. Bollinger, John A. Fuzak, M. Ray Karnes, Kermit A. Seefeld, Calvin M. Street, Robert L. Thompson, Walter B. Waetjen, and John A. Whitesel were the contributors.

The nine chapters discuss the following: improvement of the teacher; the human element — individual learning and development; demands of a contemporary culture; derivation of goals and purposes of instruction; concepts of curriculum and method; concepts of evaluation; concepts of general education; concepts of technical education; and concepts of professional education.

Rehabilitation Literature, 1950–1955

Compiled by Earl C. Graham and Mrs. Marjorie M. Mullen. Approx. 750 pp., $9. Blakiston Division of McGraw-Hill Book Co., New York, N. Y.

A reference book on rehabilitation literature, compiled by the National Society for Crippled Children and Adults. It indexes and annotates 5214 periodical articles, pamphlets, and books relating to the medical care, education, employment, welfare, and psychology of handicapped children and adults. It features in one alphabetical listing by subject, references published in the six year period, January, 1950, to December, 1955.

The book is prepared to help workers and students identify recent literature in their own field and then to enlarge their focus of interest to the entire rehabilitation problem and the co-operative efforts involved.

This book will continue to be supplemented by monthly issues of "Rehabilitation Literature; Selected Abstracts of Current Publications of Interest to Workers with the Handicapped," published since 1940 by the National Society Library.

Effective Supervision

By Milon Brown. Cloth, 259 pp., 5½ by 8¼ in., $4.50. The Macmillan Co., New York, N. Y.

An excellent book containing much that will aid in the supervision of employees, written by a man who has had a great deal of personal experience in supervisory work of many kinds.

The 12 chapters present the subject under the following headings: the job of supervision; establishing sound relationships; what is expected of the supervisor; appraising your own physical facilities; selecting employees; appraising the performance of employees; training employees; motivating employees; the supervisor's part in the labor contract; the supervisor's responsibility for cost control; maintaining safe operation; and the supervisor's future opportunities.

Mechanism

By Joseph Stiles Beggs. Cloth, 418 pp., 6¼ by 9¼ in., illus., $6.50. McGraw-Hill Book Co., New York, N. Y.

A comprehensive text on kinematics for students of engineering.

The 12 chapters of the book describe the design of mechanisms and their separate members; position, velocity, and acceleration; gears; cams; rotary drives; linkages; tension and flexural links; compression links — fluids; computing mechanisms; the control of mechanisms; special topics; Newtonian mechanics of rigid bodies; a repertory of mechanism.

The appendix covers inventions and patents, and placing the decimal point in slide-rule calculations. The book also contains a glossary.

A Dictionary of English Domestic Architecture

By A. L. Osborne. Cloth, 111 pp., $6. Philosophical Library, New York, N. Y.

This Dictionary of English Architecture leans strongly toward the classic and traditional styles, and both in its illustrations and in its definitions, devotes a minimum of space and attention to contemporary work. Historic forms, as well as ancient terms, are completely and adequately treated, and are supplemented by magnificent pen-and-ink drawings of the kind for which English architects and designers are deservedly noted. The book gives much attention to such matters as castles, gate houses, the Greek Orders, and Jacobean styles, but there is never a word about such ordinary matters as Cotswold cottages, farm buildings, etc.

Laplace Transforms for Electrical Engineers

By B. J. Starkey. Cloth, 279 pp., 5½ by 8⅛ in., illus., $10. Philosophical Library, New York, N. Y.

Language used by mathematicians in presenting the method devised by Laplace for solving linear differential equation is not readily understandable to engineers whose mathematics has not gone beyond the differential and integral calculus, the theories of complex numbers, and vector analysis.

This book, therefore, tries to explain the problems in a vocabulary that is physical rather than purely mathematical and therefore more understandable to engineers.

The 12 chapters of the book discuss the

(Continued on page 48A)

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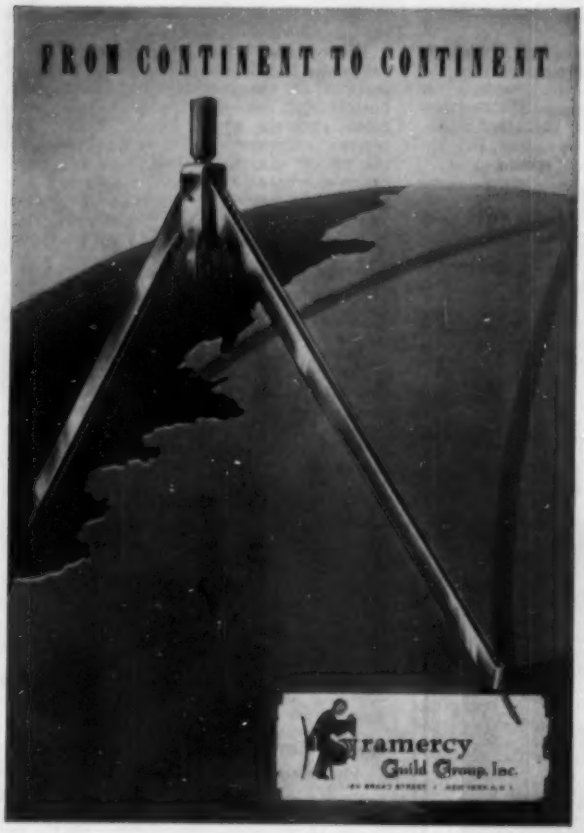

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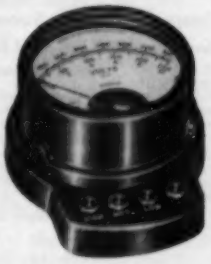

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Companion to the Model 489 d-c line. Available in wide selection of current and voltage ranges. High current ranges obtained by using the small inexpensive Model 539 current transformer with a 1 ampere instrument.

WESTON INSTRUMENTS

NEW PUBLICATIONS

(Continued from page 46A)

symbolic method and Fourier transformations, general impedances and cisoidal oscillations, introduction to Laplace transformation, application of the same to electric circuit theory, functions of a complex variable, integration in the complex plane, classifications of functions of a complex variable, analysis of contour integration, Laplace transformation, applications and theorems of the Laplace transformation, the use of the inverse Laplace transformation, and generalization of this transformation theory.

The Modern Building Encyclopaedia

Edited by N. W. Kay. Cloth, 768 pp., 6 by 9 in., illus., $15. Philosophical Library, New York, N. Y.

This is a comprehensive reference book on traditional and modern developments in the building and allied trades. It is written for the student, the contractor, and the journeyman, engaged in the building and allied trades.

The book contains 800 drawings and approximately 4000 definitive statements.

Electronics: Science of Electrons in Action

By A. W. Keen. Cloth, 256 pp., 5¾ by 8⅛ in., illus., $7.50. Philosophical Library, New York, N. Y.

This book presents in elementary terms an account of modern electronic devices and their application in science and industry. The groundwork laid in this book will enable readers to understand less elementary texts on the subject.

The contents informs the reader on what electronics is; discusses whether electrons are particles or waves; explains electronic conductors and control devices; electron beam tubes; electronic signals, circuit elements and processes; conversion and control of electric power; electronic sound, radio communication and broadcasting, and navigational aids and radar; television; switching, counting, and computing; electronics in industry; electronic instruments; and electronic excitation.

Studies for Student Pilots

By Michael Royce. Cloth, 282 pp., 5 by 7½ in., illus., $6. Philosophical Library, New York, N. Y.

An excellent little book for the student pilot. Combined in one volume, the reader will find a full description of the subjects of meteorology, theory of flight, navigation, instruments, and piston-type engines. The use of mathematics has been kept down to a minimum.

Automotive Mechanics

By William H. Crouse. Cloth, 726 pp., 6$^{15}/_{16}$ by 9¼ in., illus., $5.20. McGraw-Hill Book Co., Inc., New York, N. Y.

This is the third edition of this text. It presents a complete auto-mechanics course on operation, construction, maintenance, repair, disassembling, and adjustment. The table of contents shows how well this is done.

The explanatory descriptions are clearly and concisely stated, and the numerous fine illustrations assist the reader greatly.

Handyman's Electrical Repairs Handbook

By Robert Hertzberg. Cloth, 140 pp., 7 by 9⅞ in., illus., $2. Arco Publishing Co., New York, N. Y.

A book which explains how to repair and maintain home wiring, appliances, etc. The author not only shows how to do the job, but he also explains and illustrates how to do the work safely.

The book explains the power system in the home, wiring needs, tests and tools, lights and switches, extending outlets, two-way controls, BX cable, batteries, battery charges, clocks, transformers, sunlamps, flashlights, fans, projectors, irons, hot plates, re-cording lamps, and safety.

Holes, Contours, and Surfaces — Located, Machined, Ground and Inspected by Precision Methods

By Richard F. Moore and Frederick C. Victory. Cloth, 422 pp., 7¼ by 10¼ in., illus., $7.50. The Moore Special Tool Company, Bridgeport, Conn.

An excellent text on a difficult and very technical subject. The book contains approximately 500 illustrations, giving valuable on-the-job information to the toolmaker, tool engineer, jig-borer operator, and jig-grinder operator.

The book also provides 184 pages of Woodworth hole location tables, for converting holes on circles to rectangular co-ordinates. These tables are to be found in this book only.

How to Install TV Antennas

By Samuel L. Marshall. Paper cover, 128 pp., 5½ by 8½ in., illus., $2.50. John F. Rider Publisher, Inc., New York, N. Y.

A book which aims to help the installation man. It explains antenna fundamentals, VHF antennas, transmission lines and stubs, UHF antennas, installation materials and methods, high masts and towers, and installation problems.

(Continued on page 50A)

CASTOGLAS PROJECT of the MONTH

These seventh grade boys are pouring synthetic Castoglas tiles. There's nothing synthetic about their enthusiasm and a receptive mind easily learns the basic principles of compounding raw materials. Here this new knowledge is immediately applied in a practical way.

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"How to Start Using Liquid Plastics and Fiberglass in the School Shop" was written this summer. It is the result of extensive field work and practical experience in industrial arts, fine arts and vocational education. It explains *How to Start* a sound program and how to incorporate these new materials into the existing curriculum. "How to Cast Tiles with Castoglas" is another new CASTOLITER which is especially recommended for beginners. *Both editions are free to teachers who mail their request directly to this Company in Woodstock.* Write to:

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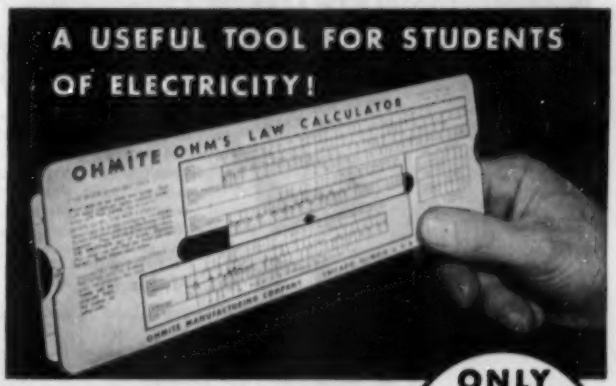

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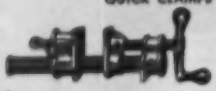

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NEW PUBLICATIONS

(Continued from page 48A)

TV Repair Questions and Answers (Deflection & H.V. Circuits)

By Sidney Platt. Paper cover, 128 pp., 5½ by 8½ in., illus., $2.10. John F. Rider Publisher, Inc., New York, N. Y.

This is the fourth of a series of question-and-answer books on practical television servicing.

There are 24 questions answered on horizontal deflection circuit servicing techniques and adjustments; 20 on horizontal output circuits; 32 on high-voltage circuits; 10 on damper-boost circuits; 12 on keyed AGC circuits; 12 on vertical output stages; and 22 on deflection yokes and systems.

Picture Book of TV Troubles — Vol. 3 (Video I-F & Video Amplifier Circuits)

By John F. Rider Laboratories Staff. Paper cover, 96 pp., 5½ by 8½ in., illus., $1.80. John F. Rider Publisher, Inc., New York, N. Y.

This third volume reports the results of trouble shooting TV receivers in the Rider laboratories.

The material was organized by symptoms based on faulty picture-tube patterns.

Magnetic Materials in the Electrical Industry

By P. R. Bardell. Cloth, 288 pp., 5¾ by 8¾ in., illus., $10. Philosophical Library, New York, N. Y.

This book discusses the possibilities and practicability of using other materials separately or combined with iron and steel to produce stronger magnets than those produced when steel is used alone.

The subject is treated very scientifically and thoroughly.

There are 11 chapters in which are discussed the theoretical considerations, permanent magnet materials, high permeability of soft magnetic materials, measurements on soft magnetic materials, power-frequency applications of soft magnetic materials, communication-frequency applications of soft magnetic materials, magnetic recording, magnetically testing materials, magnetic amplifiers (transductors), transducers, glossary terms, and magnetic units.

In the ten years 1946 through 1955, American railroads have spent more than three billion dollars for some 21,500 locomotives — most of them petroleum-burning diesels. — *Petroleum Newsnotes.*

Descriptive Material

MOULDER SERVICE MANUAL

Dependable Machine Company, manufacturers of quality woodworking machinery, has made available their new service manual for moulders. While written primarily for users of Dependable Electro-Unit Drive Moulders, it is thought that moulder operators in general might like to have a copy because of the wealth of information contained in the manual.

The main topics of the manual are: I — Introduction; II — Guarantee; III — Installing Moulder; IV — Set-up and Care of Cutter Heads and Knives; V — Operating Adjustments; VI — Operating Procedure; VII — Stoppages and Their Remedy; VIII — Types

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(For Convenience Circle Index Code 0715)

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The latest Keuffel & Esser Company catalog has been made available.

For over three quarters of a century K & E has been known as leader in the field of finest quality drawing instruments, for draftsmen and students alike.

Their catalog offers a selection of K & E instruments ranging from the superb Paragon line, recognized as the finest instruments made anywhere, and bought by students and draftsmen for lifetime service, to the very fine quality Anvil and Arrow brands, and to other good quality K & E instruments built for value and service at lower prices.

A complete line of drafting equipment is listed in the pages of the 1955–56 catalog.

(For Convenience Circle Index Code 0716)

DONJER'S NEW CATALOG

DonJer Products Company has recently published its New School Catalog. It lists and describes their pre-selected project equipment and supplies. Every DonJer product is practical, useful and fits into the curriculum of all teachers of arts and crafts.

Apply for your copy of this catalog.

(For Convenience Circle Index Code 0717)

MONOGRAPH ON ELECTRICAL MEASURING INSTRUMENTS

A new technical monograph on electrical instrumentation, written by John H. Miller, noted authority in this field, is being offered by the Weston Electrical Instrument Corporation, a subsidiary of Daystrom, Inc.

Originally prepared for the Encyclopedia Britannica, it covers the history and principles of all instrument types, including many of the recent instruments which incorporate the use of vacuum tubes as well as cathode ray tubes.

Copies of the Monograph are available to school instructors on request.

(For Convenience Circle Index Code 0718)

DOALL COMPANY TRAINING COURSE

As an educational service to industry, The DoAll Company, manufacturer of gauge blocks, now offers detailed information to all users of gauge blocks that will permit them to set up a program whereby they can inspect and calibrate their own gauge blocks accurately with only a few items of simple equipment and without expensive air-conditioning facilities.

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This educational service as set up by The DoAll Company has received approval by the National Bureau of Standards. The program is offered in a free training course at the DoAll Technical Institute. Here, companies can enroll their quality control men for the four-day comprehensive course specializing in metrology as concerns gauge block inspection and calibration.

(Continued on next page)

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(Continued from previous page)

The program is entitled "How to be Your Own Bureau of Standards," and combines both classroom sessions and laboratory practice.

(For Convenience Circle Index Code 0719)

ALVIN & COMPANY CATALOG

A new enlarged catalog, containing 84 pages, presents the complete Alvin line of drawing sets, drafting instruments, designing aids, drafting materials, drawing equipment, and measuring aids. This fine 1956 Alvin General Catalog, amply illustrated, describes equipment for engineers, draftsmen, contractors, architects, designers, surveyors, artists, engravers, navigators, craftsmen, instructors, and students.

Equipment is available in professional, technical, and school grades.

(For Convenience Circle Index Code 0720)

PITTSBURGH PLATE INTRODUCES CONCENTRATED PAINTER COLORS

The development of concentrated universal tube colorants that will make it easy for painters to do fast, on-the-job tinting of all kinds of paints in five gallon lots, was announced recently by the Pittsburgh Plate Glass Company.

The concentrated hues are said to provide the first simple means for painting contractors to furnish the full range of colors offered to consumers in the small-quantity tube color lines now available in gallons and quarts.

The tinting system, known as Pittsburgh Maestro Concentrated Colorants, consists of nine heavily concentrated colors plus black and white which will be packaged in eight-ounce and 16-ounce tubes. Furnished with the tubes will be a book of 300 color formulas which provide the key to quick mixing of the 300 decorator colors in the Company's Maestro Colors System. In addition, the concentrated colorants offer an unlimited range of custom colors to painting contractors.

For further information on the many other interesting aspects of this development, write to the Pitsburgh Plate Glass Company.

(For Convenience Circle Index Code 0721)

CATALOG AND MUMART COLOR DESIGN BOOKS

The Craftsman Supply House has made available their new catalog which presents a group of useful objects that may be adapted for craft programs. The Craftsman Supply House is exclusively a craft supply organization, which devotes its resources to the development of new ideas and materials.

This firm also publishes the Mumart Color Design Books, Nos. 1, 2, 3, and 4.

Book 1, describes the Pacific Dogwood Matched Sets: handbags, billfolds, keycases, change purses, coasters, book ends, etc., and explains how to emboss leatherwork. This book contains 11 projects.

Book 2, the Wild Rose Family Set, embraces 17 projects, and a description of "How to Make Lapel Pins."

Book 3, Apple Blossom and Doreta, presents 12 projects, and an explanation of "How to Make Book Ends."

Book 4, presents the Trillium Family Set — 12 projects, and "How to Make Billfolds."

(For Convenience Circle Index Code 0722)

FILMSTRIPS ON "OUR NEIGHBORHOOD HELPERS"

"Our Neighborhood Helpers," produced by The Jam Handy Organization in color photography, shows what various workers do in their daily jobs. Ways in which we can help these workers are suggested and demonstrated. This, in turn, helps to develop the concept of the interdependence of people in the community.

The titles in the series are the mailman, the policeman, the fireman, the grocer, the milkman, and the librarian. The series has been pretested in actual schoolroom use.

(For Convenience Circle Index Code 0723)

INSPECTING FORD IAA PROJECTS

H. C. Elliott, assistant state supervisor for trade and industrial education, Tuscaloosa, Ala., was one of the industrial educators and craft experts who judged 5000 final entries in Ford Motor Company's tenth annual Industrial Arts Awards program at Dearborn,

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Mich. The Ford IAA competition attracted approximately 40,000 projects from the United States, Canada, and Puerto Rico.

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By George A. Willoughby.....$1.44 (#2 in coupon.)

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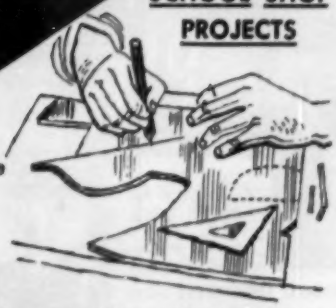

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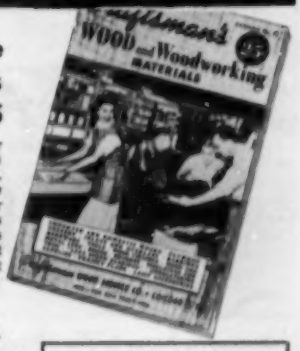

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Shop Equipment News

NEW DELTA LATHE DESIGNED

A new low-cost, big capacity, variable-speed 12-in. wood lathe has been introduced by Rockwell Manufacturing Company's Delta Power Tool Division.

It is designed to meet demands for a low-price, heavy-duty wood turning production tool that is adaptable to other operations.

New 12-in. Gap Bed Cabinet Lathe

It is adaptable to metal spinning, polishing, sanding, fluting, and reeding as well as all inboard and outboard turning operations, and it is also adaptable to light turning of metals.

In addition, there are more than 50 engineered accessories available, making this one of the most versatile of all lathes.

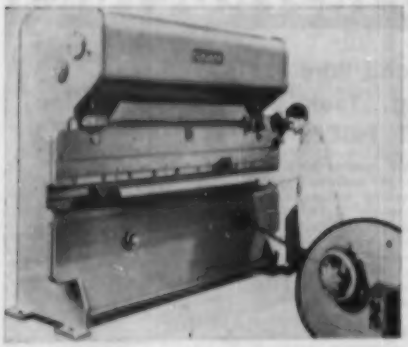
All moving parts are enclosed.

Further information on the durability, capacity, and numerous other outstanding features on this lathe is available upon request.

(For Convenience Circle Index Code 0701)

NIAGARA PRESS BRAKES BACK GAUGE

A new power driven, front operated, micrometer back gauge is now available as optional equipment on Niagara Press Brakes of 50 through 150-ton capacities.



Niagara Press Brakes Back Gauge

This new gauge enables accurate, quick settings, without requiring the operator to leave the front of the machine — an especially important feature when frequent gauge settings are necessary.

For more detailed information and descriptive literature write to Niagara Machine & Tool Works.

(For Convenience Circle Index Code 0702)

LUFKIN'S NEW TAPE RULE

A new tape rule, with decimal graduations in 10ths (.10) and 50ths (.02) inch, to meet the requirements of the electronics, automotive, aircraft, and other industries is now available from The Lufkin Rule Company.

Lufkin's New Tape Rule

The top edge of the blade is graduated in 10ths, and the bottom edge is graduated to 50ths for the first twelve inches, with the balance graduated to 10ths. The 50ths divisions are rapid reading; each fifth division numbered for faster, easier reading.

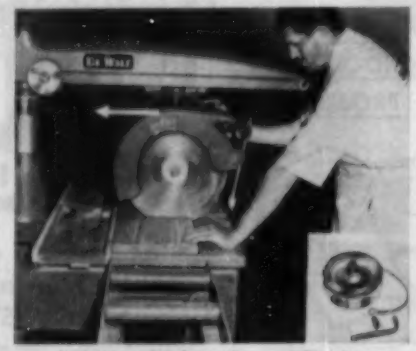
The tape blade has an all-metal chrome clad finish and a self-adjusting end hook. It is furnished in a heavily plated steel case and in lengths of 6, 8, 10, and 12 feet.

Further information may be obtained by writing to The Lufkin Rule Company.

(For Convenience Circle Index Code 0703)

CARRIAGE RETURN SAFETY DEVICE

De Walt Inc., a subsidiary of American Machine and Foundry Co., announces a new safety device for the automatic return of the motor carriage and cutting member of its radial arm woodworking machines.



Spir'Ator Safety Return Device

Known as the Spir'Ator safety return device, this spring-actuated unit greatly increases operator protection from moving parts of the machine by immediately returning the cutting mechanism to rear idle position the instant he relaxes his forward pull on the carriage.

Further information may be obtained upon request.

(For Convenience Circle Index Code 0704)

EASTMAN'S NEW PROJECTOR

A new 16mm. movie projector that permits addition of background music and narration to camp, recreation and welfare agency films without special equipment and elaborate sound studios has been announced by Eastman Kodak Company. This projector combines the principles of a tape recorder and a movie projector into one compact, portable unit which makes sound movies as inexpensively as most silent movies.

New Kodascope Pageant Sound Projector

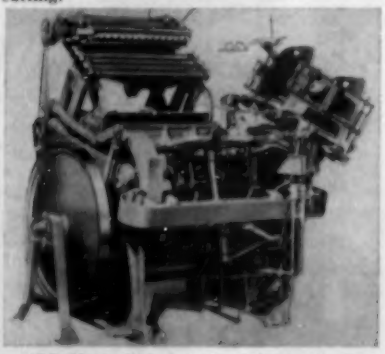
With the new Kodascope Pageant Sound Projector, Magnetic-Optical, an organization may first make a 16mm. film, have an inexpensive magnetic striping (similar to that used for a tape recording) added, and then record narration and background music in the organization's own office. The narration can be erased and re-recorded as often as desired to provide different messages for various audiences, or small sections of the sound track can be changed conveniently. A magnetic track can be added to a sound film with a conventional "optical" track. Many other interesting features are embodied in this useful projector.

Detailed information may be obtained by writing to The Eastman Kodak Company.

(For Convenience Circle Index Code 0705)

ATF-CHANDLER & PRICE PLATEN PRESS

The new ATF-Chandler & Price 14½ by 22 Craftsman Automatic Platen Press handles material ranging in thickness from 13 lb. onionskin to heaviest cardboard or even wood, from postcard size to 15 13/16 in. by 23¼ in., in rectangular or odd shapes, envelopes, cartons, novelties, book cases, or other types of production work. It has sufficient impressional strength for printing the heaviest forms, and for cutting, creasing, embossing, and die cutting.



ATF-Chandler & Price Platen Press

The Craftsman Automatic operates smoothly at speeds up to 2600 impressions per hour. The Super Heavy Duty Craftsman, of heavier construction throughout, possesses all the features of the regular unit and operates at 2300 impressions per hour.

The ATF-Chandler & Price Craftsman Automatic Platen Presses are part of the Chandler & Price line which will be distributed by American Type Founders.

American Type Founders is again handling the complete line of Chandler & Price presses,

(Continued on page 56A)

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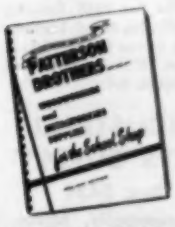
The new 1956 Patterson Brothers catalog, listing all the latest in: Metals, Benches, Electrical supplies, Finishing materials, Hand tools, Hardware, Machine tools, Metalworking tools, Portable Electric tools, Precision tools, Sheet metal equipment, Welding Equipment. Contains up-to-the-minute information on equipment needed for the complete school shop.



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SHOP EQUIPMENT NEWS

(Continued from page 54A)

paper cutters and accessories, renewing a 60-year old business relationship.

(For Convenience Circle Index Code 0706)

NEW GENERAL ELECTRIC PROJECTION LAMP

A gold-tipped photo projection lamp which operates on its side and makes practical low-contour projectors has been developed by the General Electric Company.

Key to G.E.'s novel design is the filament which has been rotated so that with the lamp on its side, the filament is still vertical — the normal and most efficient operating position.

Photo industry firsts incorporated in the lamp include the elimination of the usual metal base and a golden opaque top.

These features make possible a lamp which (1) operates at cooler temperatures, (2) is precision-focused, and (3) ensures cost savings in projectors designed for its use.

The lamp, which will be manufactured in both 300- and 500-watt sizes, was introduced in Chicago at a trade show, the National Audio Visual Association meeting at the Sherman Hotel, July 22–25. It has many advantages and other outstanding characteristics.

Production of the new lamps is scheduled for early in 1957 at the department's East Cleveland Lamp Plant.

(For Convenience Circle Index Code 0707)

NEW PALMGREN NO. 55 VISE

Chicago Tool and Engineering Company announces the addition of the Palmgren No. 55 All Angle Vise to their complete line of machine vises.

Palmgren No. 55 Vise

This new vise provides a quick, easy setup for any machining operation that requires a simple or compound angle. Difficult compound angle milling, drilling, grinding, reaming, and checking operations may be performed with an absolute minimum amount of time required for setup. Work is held rigidly and vise can be securely locked in any position.

Jaw width of this vise is 2½ in., jaw-opening 2½ in., and jaw depth 1½ in.

Further information on its many useful features, including its separate adjustments for angle setup, may be obtained upon request.

(For Convenience Circle Index Code 0708)

STORAGE FOR SMALL PARTS

Masonite Corporation is manufacturing a device for the storage of small parts — *junk jars*, which are fitted to hang on Masonite "Peg-Board" panels. A row of the jars, which are 3 1/3 in. deep and 2 in. in diameter, on the toolboard can hold nails, screws, bolts, nuts, and other small parts. Hung on "Peg-

(Continued on page 58A)

THE REPCO SAFETY HOLD-DOWN
for the jointer

Never before, has a safety device given so much satisfaction, providing a safety factor that is a SENSATION in ACCIDENT PREVENTION.

The REPCO Safety Hold-down, by patented adjustable spring-powered pressure, produces 1956's OUTSTANDING CONTRIBUTION to safety in the Woodshop.

Join the hundreds of highly satisfied users by early installation. You, too, will say

"WHY DIDN'T I THINK OF THAT"

It definitely is "THE ANSWER," and eliminates the jointer hazards. This is a safety unit recommended for ALL schools, homeshops and industry. You can buy and use with CONFIDENCE.

For complete information and description write today for free brochure. State size and make of Jointer.

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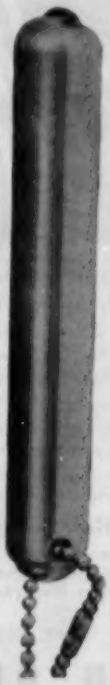

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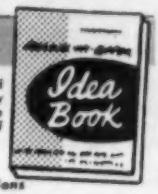

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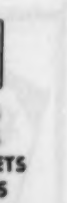

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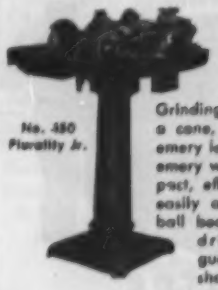

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SHOP EQUIPMENT NEWS

(Continued from page 56A)

Board" panels in the kitchen, sewing room, hobby room, utility or recreation area, they are ideal for keeping similar items segregated but handy for instant use.

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Each unit consists of a jar, a hanger clip which fits into two holes of the perforated hardboard, and a jar-top bracket which slips down and interlocks in position with the clip. No tools are required. The jar slips easily and securely into place.

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More detailed information is available upon request.

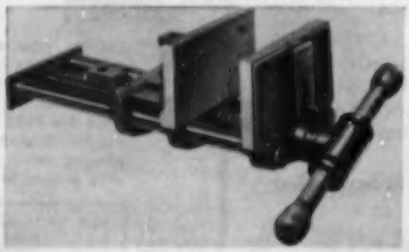
(For Convenience Circle Index Code 0709)

COLUMBIAN SCREW VISE AND POWER-SLIDE

A new line of rapid acting continuous screw woodworkers' vises, consisting of 8 individual models, is announced by The Columbian Vise & Mfg. Co.

These are ideal for use where changes in jaw openings must be made frequently and fast.

Outstanding vise feature is a completely new



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Vises are available in 4 by 7, and 4 by 10-in. jaw sizes and in 9 and 12-in. jaw openings.

For specifications and details write for Bulletin LL-3184.

(For Convenience Circle Index Code 0710)

NEW PLASTIC SMOOTH-HOOK TEMPLES

The new plastic, Smooth-Hook Temple, a development of the patented Retrax Temple for Eye Savers Tuc-Away and Visor-Tuc Safety Spectacles, is announced by the Watchemoket Optical Company.

The hooks rotate smoothly and continuously through 360 deg., and telescope in and out to enable perfect fit by the wearer without the use of tools. The temple hooks, made of strong, tough plastic, are virtually unbreakable in normal use. They rest comfortably and snugly against the head and retain their position through substantial friction produced by the close fit of the plastic hook into the plastic temple.

New Plastic Smooth-Hook Temples

These new, smooth-hook style temples have the same flexible hinges as the regular Plastic Retrax Temples to enable the wearer to angle the lenses for snug fit at the cheek.

Detailed information is available upon request.

(For Convenience Circle Index Code 0711)

BENCHES AND OTHER SCHOOL-SHOP EQUIPMENT

Woodworking benches like those used in industry are shown here in use in the industrial-arts shop of Central Bucks High School, Doylestown, Pa. The benches were adapted by Standard Pressed Steel Company, from its complete line of school shop equipment including benches for sheet-metal, electrical, lay-

Standard Pressed Steel Company Benches and other Shop Equipment

out, and soldering work. A drawing table with built-in storage space for drawing boards, cabinets for tool storage, a book and apron storage rack and accessories complete the line of Hallowell school shop equipment made by SPS and available through industrial shop equipment distributors.

(For Convenience Circle Index Code 0712)

(Continued on next page)

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SHOP EQUIPMENT NEWS

(Continued from previous page)

BOICE-CRANE LEFT- AND RIGHT-HAND SHAPERS

Shapers for left-hand and right-hand operation are now made by Boice-Crane Company. While shaper operation ordinarily is from the right to the left hand side of the piece, with the spindle turning counter-clockwise, reversed spindle rotation is sometimes necessary for working with the grain or in the best direction with unusual grains. Many times it is also desirable to turn the cutters upside down which necessitates working in the opposite direction. The spindle of Boice-Crane shapers is furthermore invertible for the use of large or small cutters. Many large wood shops will now order these shapers in pairs to benefit from this dual operation. Free literature on these shapers is available.

Boice-Crane Left- and Right-Hand Shapers

(For Convenience Circle Index Code 0713)

NEW CARBIDE-WHEEL GLASS CUTTER

For demanding craftsmen everywhere, Millers Falls Company has introduced the new No. 66 Carbide-Wheel Glass Cutter. It features a cutting wheel of carbide — the hardest metal known to man. The cutter is set on a smooth-running axle with a special bearing (patent applied for).

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(For Convenience Circle Index Code 0714)

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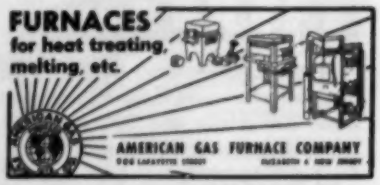

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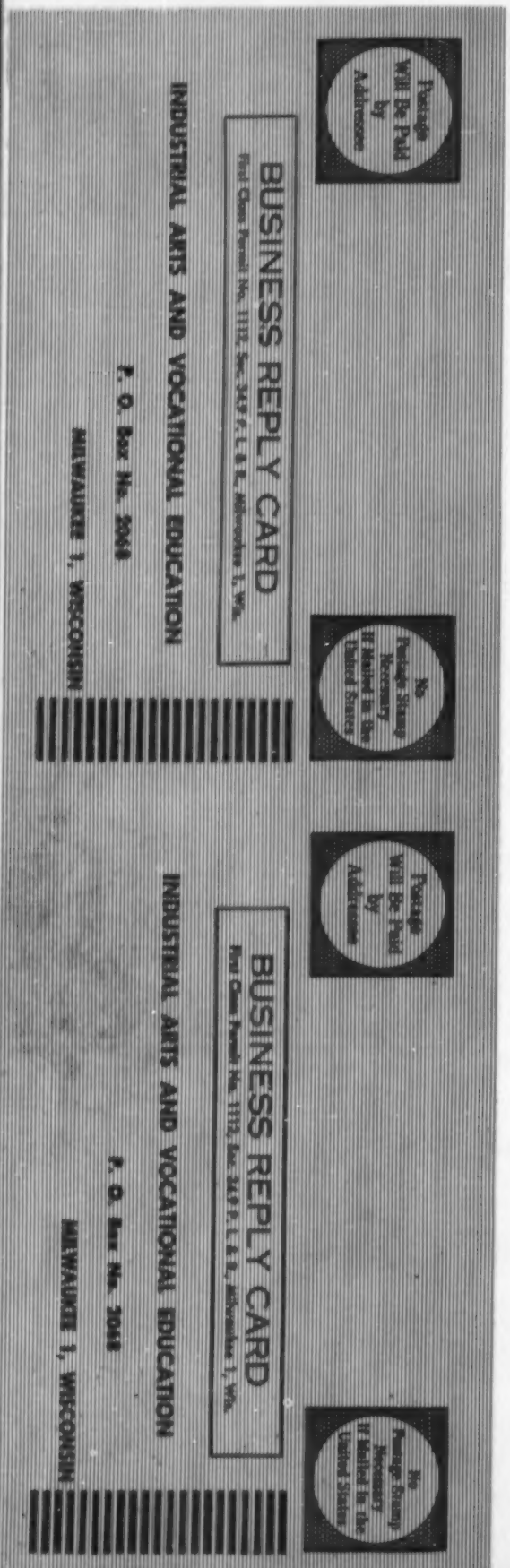
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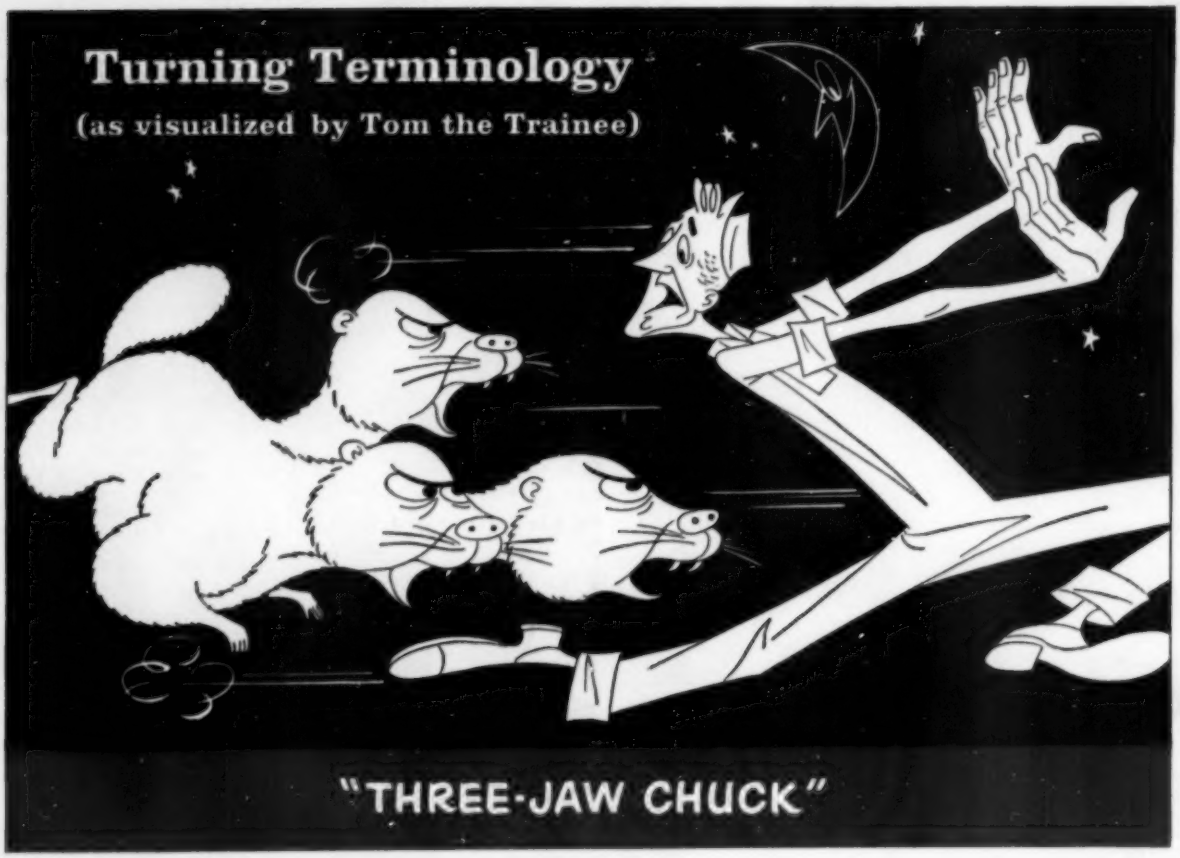

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